

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
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Comment on hess-2022-217

Anonymous Referee #2

Referee comment on "Development of a novel daily-scale compound dry and hot index and its application across non-arid regions of China" by Huimin Wang et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-217-RC2>, 2022

General Comments:

Under climate change, the occurrence of compound dry and hot events (CDHEs) has increased significantly, adversely affecting the socio-society and ecosystem. This summer, the extreme heat and drought that has been roasting a vast swath of southern China for at least 70 straight days has no parallel in modern record-keeping in China, or elsewhere around the world (e.g., Europe) for that matter. Furthermore, occurrences of short-term CDHEs have increased with global warming. However, most current indicators generally monitor CDHEs at monthly scales, which cannot reflect short-term CDHEs. Thus, it is important to develop a daily-scale index for monitoring short-term CDHEs, which can provide useful insights for understanding short-term compound dry and hot events and valuable information timely for stakeholders. Additionally, in future research, maybe you can calculate the daily drought index and DCDHI across global lands, which is helpful to evaluate evolutions of flash droughts and CHDEs in other regions. In a word, it is a topic of interest to the researchers in the related research but it can need some improvement before acceptance for publication. The specific comments are as follows:

Major comments:

(1) Logic-wise, the abstract can be organized better. I suggest authors re-organize the abstract.

(2) In the Introduction section, the connection between some sentences is abrupt. For example, the content in line 34 suddenly begins to describe the influence factors that

control the evolution of CDHEs, which is not mentioned in the previous and afterward sentences. In addition, in line 46, the authors mentioned that the threshold-based method did not consider other characteristics of the compound events, which was not accurate because Feng et al. (2020) calculated frequency, severity, and duration based on this method. I suggest you can rewrite this sentence. Please check the syntax and logic of this Introduction section carefully.

(3) "p" was used in the left side of both equation (1), equation (8), and equation (9), but they have different meanings or represent probability calculated by different distribution functions. Therefore, authors should distinguish them, maybe p_t in equation (1), p_z in equation (8), p_j in equation (9). Please check it. Accordingly, L143 "Lastly, the daily SZI was obtained by standardizing p as Eq (2)" should be more clarified. You use log-logistic cumulative distribution to fit WSD when calculating SZI. Please clarify why you chose this distribution or add some references.

(4) The authors calculated daily SPI, SPEI, SZI, STI, and DCDHI, but are these datasets available for publication? If possible, others can use these datasets to assess short-term droughts and CDHEs, which is helpful for related research.

(5) There are a lot of long sentences in the paper (complete sentences followed by V-ing+sentence instead of sentences connected with conjunction words). In other words, too much information is conveyed in one sentence. This may make readers confused. Thus, I suggest authors to rewrite or break long sentence into a few shorter sentences and make it more readable without changing the meaning. For instance, the sentence "Other joint extremes indices combining drought and hot indices, such as the Standardized Compound Event Indicator and Blended Dry and Hot Events Index, are more flexible than the threshold-based indices when analyzing the spatial and temporal characteristics of compound extremes" in the second paragraph of the Introduction includes 40 words and introduced another common method and its advantage compared with threshold-based indices. It will be better to use a few shorter sentences to convey the same information.

(6) More/appropriate conjunction words can be used to make the writing more fluent.

Minor comments:

(1) As you have given the abbreviation of compound dry and hot events, you should change 'compound dry and hot events' to 'CDHEs' in lines 20, 25, and 26. In line 27, the 'new tool' should be changed to 'new index'. In addition, the authors should unify the uses of 'index' and 'indicator'.

(2) Line 50. The 'can not' should be changed to 'cannot'.

(3) Line 57. Can you give some examples to indicate that short-term CDHEs have increased?

(4) Line 61. 2. Please also check other abbreviations to make sure their unity. For instance, there are "SDHEs" and "SCDHI" in L61 and L65 respectively. Do they have the same meaning?

(5) Line 73. Maybe 'flash drought' is more suitable than 'the short-term duration droughts'.

(6) Line 86. 'north-western' should be changed to 'northwestern', and 'The' should be changed to 'the'.

(7) Line 135. 'the jth month' should be changed to 'the j th month'.

(8) Line 152. The authors proposed DCDHI by linking SZI and STI. But the CDHE was still defined based on temperature and WSD (L152-L153 "The compound dry and hot event was identified when the temperature was less than a threshold value and WSD was higher than a threshold") instead of SZI and STI, why is that? Moreover, the authors did not make the exact value of the threshold clear. What are the exact values of temperature and WSD to define the occurrence of dry and hot event in this study?

(9) Line 165. 'compound characteristics' should be changed to 'characteristics of CDHEs'.

(10) Line 177. Before the evaluation of drought indices in drought monitoring, we don't know which drought index is more suitable to construct DCDHI. Therefore, I suggest you change the sentence 'The DCDHI was constructed based on daily SZI and STI' to 'The DCDHI was constructed based on daily drought and hot indices'.

(11) Line 178. Are 'soil moisture or 'normalized soil moisture used to evaluate drought indices? Please check the expression.

(12) Line 193. What is 'SSMI' mean? Please give the full name of the 'SSMI'.

(13) Line 206. 'north-eastern' should be changed to 'northeastern'. Change other similar expressions.

(14) Line 229. Remove the full stop before the word 'accompanied'.

(15) Line 304, is it 'between 1961-1989 and 1990-2021 periods' or 'between 1990-2021 and 1961-1989 periods'? please check the expression.

(16) You should add units for figures 10 and 11.

(17) Line 416, the journal name should be capitalized. Please check and unify reference formats carefully.

Reference:

Feng, S., Wu, X., Hao, Z., Hao, Y., Zhang, X., and Hao, F.: A database for characteristics and variations of global compound dry and hot events, *Weather and Climate Extremes*, 30, 100299, DOI: 10.1016/j.wace.2020.100299, 2020.