

***Interactive comment on* “Linking drought indices to impacts to support drought risk assessment in Liaoning province, China” by Yaxu Wang et al.**

Anonymous Referee #2

Received and published: 29 October 2019

General comments

The paper is interesting, since it uses observed numerically measured drought impacts, which are often not available in many countries. The results clearly show that there is a correlation between drought indices and drought impacts. Vulnerability analysis is also appreciable, since it investigates the factors that make cities more vulnerable to droughts. The paper addresses questions within the scope of NHESS. I believe that some minor revisions are needed in order to make it publishable.

Specific comments

1. The abstract should be shortened; now it consists of 400 words, while NHESS standards foresee a 100-200 word abstract.

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- 127: you said that one representative meteorological site in each city was selected to represent the meteorological condition for the whole city. Which are the criteria you adopted to select the representative station?
2. Line 135-136: NDVI data: you used MODIS data, which are available from 2000 to 2013. Why didn't you consider the NOAA AVHRR data, which span from 1981 to present? In this case you can include in your analysis also the period from 1990 to 2000.
 3. Can you please specify how you computed the monthly average NDVI?
 4. Line 140: which criteria is adopted to establish the beginning of a drought event or to trigger a drought warning according to the SFDH?
 5. Line 244: Figure 2: since it seems that SPEI performs better than SPI, the same graph showed for SPI can be presented for SPEI too.
 6. Line 234: Figure 3: it is not clear to me why at line 231 you say "Figure 3 shows the spatial distribution of the annual average of each drought impact type collected between 1990 and 2016" and in the figure caption you report a different period (1990-2013). Please, correct the wrong one.
 7. Line 301-302: Can you please clarify why you select $SPEI_6 = -1.5$ for the second stepwise regression presented in the paragraph "Vulnerability analysis"?

Technical corrections

- Line 12: I believe there is a typing error: risk assessment (instead of risk assessments).

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- Line 33-35: I would rephrase the sentence in the following way: “Drought is one of the most pervasive natural hazards which can cause huge societal impacts. Drought impacts are mainly non-structural, widespread over large areas, and delayed with respect to the event; therefore, it is still challenging to properly define, quantify and manage drought.”
- Line 39: I will substitute “successive” with “consecutive”.
- Line 60: I believe there is a typing error: impacts instead of impact.
- Line 66: I believe you forgot to insert from: “impacts from a range of sources. . .”
- Line 68: I believe there is a typing error: “at country level”.
- Line 70-72: please review this sentence, since it is not clear.
- Line 80: I believe there is a typing error and “whilst” should not have a capital letter.
- Line 82-86: please review this sentence in order to explain better the concepts.
- Line 92: I believe there is a typing error: previous studies have BEEN focused.
- Line 115-116: please review the sentence “Thus, Liaoning province is one of the severe water-shortage provinces in northern China”.
- Line 125 Remove “including daily precipitation and temperature”; you have already specified this point at the previous line.
- Line 147: Vulnerability factors were collected from the 2017 Liaoning province Statistical Yearbook to explain the drought vulnerability. Please, explain it better.
- Line 157: I believe there is a typing error: “The WMO recommends. . .”

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- Line 162-166: Please, review the sentence, since it is not easy to understand.
- Line 170-171: I would change the sentence in the following way: “Precipitation in Liaoning province is concentrated between April and September; this period corresponds to the growing stage of spring maize”.
- Line 171-172: Please review the sentence in order to explain which SPI6 and SPEI6 values you used in your analysis.
- Line 172-173: Please review the sentence in order to explain which SPI and SPEI 12, 15, 18 and 24 values you used in your analysis.
- Line 181: I will rephrase the sentence in this way “17
- Line 193-194: I will rephrase the sentence in this way “it can be inferred that the greater the impact caused by droughts of the same severity (measured according to SPI/SPEI), the higher the drought vulnerability of the city.”
- Line 207: I believe there is a typing error “where y_i and \hat{y}_i are the observed drought impacts and the estimated drought impacts”.
- Line 219: I believe there is a typing error: “. . . and min DI are the maximum. . .”
- Line 231-233: please, review the sentence to explain better what you have done.
- Line 277: I believe there is a typing error, since I cannot find an impact type called “DIS” in Table 1.
- Line 316: I would change the sentence in the following way: “data was systematically collected at country level”.
- Line 239: I would change the sentence in the following way “but may not be appropriate. . .”

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- Line 350: I would change the sentence in the following way: “Dalian and Fuxin showed the highest correlation coefficients among drought impacts and drought indices in all cases”.
- Line 353-354: please rephrase the sentence.
- Line 356-360: please, rephrase the sentence, since it is not clear.
- Line 362: I would change the sentence in the following way: “The drought vulnerability map can be used to support drought risk planning, in order to help decision-makers to implement appropriate drought mitigation activities. . .”
- Line 372: I would substitute “severity” with “severe”.
- Line 377: I would substitute “performance” with “perform”.
- Line 387: I believe there is a typing error and “impact” should be used instead of “impacts”.

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