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Natural Hazards and Earth System Sciences
Discussions

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

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Manuscript nhess-2019-310 "Linking drought indices to impacts to support drought risk assessment in Liaoning province, China" – Point by point response to referee 2 comments.

We thanks referee #2 for the feedback to our manuscript. We appreciate all the comments and suggestions and it is very useful to improve its quality and readability. The detailed Answer to each comment and suggestion are as follows.

Specific comments

The abstract should be shortened; now it consists of 400 words, while NHESS standards foresee a 100-200 word abstract.127: you said that one representative meteoro-

logical 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?

We thank the reviewer for this important comment. We made it shorter as suggested.

We considered the data quality, length of the time series and location of the stations to select the representative station. We have added some content to make it clearer.

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.

We thank the reviewer for this important comments. Yes, it is true that NOAA AVHRR has a long time series data. But, on the one hand, considered the advanced characteristics of MODIS data with high spatial and spectrum resolution, greatly improved data acquire ability and widespread applied on drought monitoring, etc., we used MODIS data instead. Also, it is easy to get access to the MODIS product of the NDVI.

Can you please specify how you computed the monthly average NDVI?

The monthly average NDVI products are available from the Geospatial Data Cloud (http://www.gscloud.cn/), and all the products quality were inspected. So we directly downloaded and used the monthly average NDVI products. According to the description of the products, the daily maximum NDVI data were used to represent the monthly average NDVI.

Line 140: which criteria is adopted to establish the beginning of a drought event or to trigger a drought warning according to the SFDH?

There are several criteria to trigger a drought warning for SFDH according to the local specific Drought Preparedness Plan, , such as meteorological drought monitoring result from the China Meteorological Administration, Soil moisture and hydrological drought monitoring from the Ministry of water resources and drought impacts collected

from the county-level in the system. So, basically, the criteria to trigger a drought warning are the integration of multiple factors, and are different with varied places.

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.

We thank the reviewer for this comment and we fully agree with him on this point. We presented the SPI for SPEI in figure 2 as suggest.

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.

Thanks for your suggestion. We corrected this error.

Line 301-302: Can you please clarify why you select SPEI6=-1.5 for the second stepwise regression presented in the paragraph "Vulnerability analysis"?

Firstly, there are a certain amount of drought impacts when SPEI6=-1.5 for all types of drought impacts. If we use the result of regression analysis when SPEI6 is equal to -1, some types of the drought impacts are not be triggered. If we use the result of regression analysis when SPEI6 is equal to -2, due to the serious of drought, there could be serious drought impacts in all cities. Secondly, the results of relative value between cities are consistent when SPEI ranges from -1 to -2. Therefor we select SPEI6=-1.5 as a suitable point to stepwise regression.

Technical corrections

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

Yes we corrected it and delete 's'.

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 im-

pacts 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."

Yes we rephrased the sentence as suggest.

Line 39: I will substitute "successive" with "consecutive".

Yes we replaced the "successive" with "consecutive".

Line 60: I believe there is a typing error: impacts instead of impact.

Corrected.

Line 66: I believe you forgot to insert from: "impacts from a range of sources.."

Corrected.

Line 68: I believe there is a typing error: "at country level".

The data collection system reports to the national level through different grades of government, county-city-province-nation. Here it describes the data reporting process although this study obtains data from national level.

Line 70-72: please review this sentence, since it is not clear.

Rephrased.

Line 80: I believe there is a typing error and "whilst" should not have a capital letter.

We corrected it as suggest.

Line 82-86: please review this sentence in order to explain better the concepts.

We rephrased the sentence.

Line 92: I believe there is a typing error: previous studies have BEEN focused.

We corrected it and added 'been'.

Line 115-116: please review the sentence “Thus, Liaoning province is one of the severe water-shortage provinces in northern China”.

We changed it as suggest.

Line 125 Remove “including daily precipitation and temperature”; you have already specified this point at the previous line.

We delete it as suggest.

Line 147: Vulnerability factors were collected from the 2017 Liaoning province Statistical Yearbook to explain the drought vulnerability. Please, explain it better.

We thank the reviewer for this comment we made it clearer.

Line 157: I believe there is a typing error: “The WMO recommends: : :”

Corrected.

Line 162-166: Please, review the sentence, since it is not easy to understand.

We have restructured the sentence to make it clear.

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”.

Thanks for your suggestions. We replaced the sentence.

Line 171-172: Please review the sentence in order to explain which SPI6 and SPEI6 values you used in your analysis.

We agree with the reviewer and we added some explanation to make it clearer.

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.

Rephrased.

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.”

Thanks for your suggestion and we replaced it as suggest.

Line 207: I believe there is a typing error “where yi and ˆ yi are the observed drought impacts and the estimated drought impacts”.

Corrected.

Line 219: I believe there is a typing error: “ and min DI are the maximum”

Yes we corrected this error.

Line 231-233: please, review the sentence to explain better what you have done.

Yes we have rephrased it.

Line 277: I believe there is a typing error, since I cannot find an impact type called“DIS” in Table 1.

We corrected this error.

Line 316: I would change the sentence in the following way: “data was systematically collected at country level”.

We have replaced this sentence in the revised paper as suggest.

Line 239: I would change the sentence in the following way “but may not be appropriate..”

Rephrased.

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”.

Thanks for your suggestions and we have replaced this sentence.

Line 353-354: please rephrase the sentence.

Thanks for your suggestions. We restructured the sentence to make it clear.

Line 356-360: please, rephrase the sentence, since it is not clear.

We rephrased the sentence to make it clearer.

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”

Thanks for your suggestions. We replaced with this sentence.

Line 372: I would substitute “severity” with “severe”.

We replaced“severity” with “severe”.

Line 377: I would substitute “performance” with “perform”.

We have replaced “performance” with “perform” in the revised paper.

Line 387: I believe there is a typing error and “impact” should be used instead of“impacts”.

Corrected.

References

Liaoning Province Bureau of Statistical: Liaoning Statistical Yearbook 2016, China Statistics Press, 2017.

Yan, L., Zhang, J., Wang, C., Yan, D., Liu, X., and Tong, Z.: Vulnerability evaluation and regionalization of drought disaster risk of maize in Northwestern Liaoning Province, Chinese Journal of Eco-Agriculture, 20, 788-794, 2012.

Zhang, J. Q., Yan, D. H., Wang, C. Y., Liu, X. P., and Tong, Z. J.: A Study on Risk Assessment and Risk Regionalization of Agricultural Drought Disaster in Northwestern Regions of Liaoning Province, Journal of Disaster Prevention & Mitigation Engineering, 2012.

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