Natural Hazards
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Discussions

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Interactive
comment

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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Dear authors,

congrates to your very well written piece of work exploring the unique Chinese drought impact database and establishing drought impact functions.Nice! In principal I agree with your study methodology and results. Nevertheless I do have some comments which you can find more detailed in the attached PDF.

The major points are you missed the publication of Hao et al. (2011) who used this kind of input in china- county level some caveats of defintiions/ clarification of terminology Please be more explicit explaining your vulnerability assessment: combination method etc.

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[Discussion paper]

Discussion: You almost fully miss a comparison to other studies (methodologies and results)

I'm looking forward to read over it again or discuss some of the actually existing, comparable approaches.

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1 **Linking drought indices to impacts to support drought risk**
2 **assessment in Liaoning province, China**

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10 **Abstract.** Drought is a ubiquitous and reoccurring hazard that has wide ranging impacts on society, agriculture and the
11 environment. Drought indices are vital for characterizing the nature and severity of drought hazards, and there have been
12 extensive efforts to identify the most suitable drought indices for drought monitoring and risk assessments. However, to date,
13 little effort has been made to explore which index(s) best represents drought impacts for various sectors in China. This is a
14 critical knowledge gap, as impacts provide important 'ground truth' information. They can be used to demonstrate whether
15 drought indices (used for monitoring or risk assessment) are relevant for identifying impacts, thus highlighting if an area is
16 vulnerable to drought of a given severity. The aim of this study is to explore the link between drought indices and drought
17 impacts, using Liaoning province (northeast China) as a case study due to its history of drought occurrence. To achieve this
18 we use independent, but complementary, methods (correlation and random forest analysis). Using multiple drought indices –
19 Standardized Precipitation Index (SPI), Standardized Precipitation Evapotranspiration Index (SPEI), Soil Moisture (SoilM)
20 and the Normalized Difference Vegetation Index (NDVI) – and drought impact data (on crop yield, livestock, rural people and
21 the economy) correlation and random forest analysis were used to identify which indices link best to the recorded drought
22 impacts for cities in Liaoning. The results show that the relationship varies between different categories of drought impacts
23 and between cities. SPEI with a 6-month accumulation (SPEI6) had a strong correlation with all categories of drought impacts,
24 while SPI12 had a weak correlation with drought impacts. Of the impact datasets, 'drought suffering area' and 'drought impact
25 area' had a slightly strong relationship with all drought indices in Liaoning province, while 'population and number of livestock
26 with difficulty in accessing drinking water' had weak correlations with the indices. Based on the linkage, drought vulnerability
27 was analyzed using various vulnerability factors. Crop cultivated area was positively correlated to the drought vulnerability
28 for five out of the eight categories of drought impacts, while the total population had a strong negative relationship with drought
29 vulnerability for half the drought impact categories. This study can support drought planning efforts in the region, and
30 provides a methodology for application for other regions of China (and other countries) in the future, as well as providing
31 context for the indices used in drought monitoring applications, so enabling improved preparedness for drought impacts.

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Fig. 1.