

## ***Interactive comment on “Reconstructions of Droughts in Germany since 1500” by Rüdiger Glaser and Michael Kahle***

**Anonymous Referee #1**

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The manuscript “Reconstructions of droughts in Germany since 1500” focuses on the calculation of various indicators for droughts since 1500 based on the historical climate and environmental database tambors.org. Specifically a Historical Precipitation Index (HPI) is calculated and correlated with the SPI index. Additionally, a Historical Drought Index (HDI) and a Historical Wet index (HWI) are derived. Information on the long term development and dynamics of droughts is scarce and consistent long time-series are hardly available. However, the analyses of drought time series is highly relevant and important in the context of climate change and its impacts. For the development of sustainable risk management strategies for droughts it is important to know how droughts developed over time, and which drivers influenced their temporal dynamics to draw conclusions for the future. Thus, the research question dealt with and the objective of

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the manuscript are innovative and highly relevant. However, I see the following major problems which require substantial re-writing of large parts of the manuscript as well as additional analyses during the revision. Thus, I suggest major revision (or even reject with an invitation to re-submit):

1) The development, i.e. calculation of all presented indicators is not provided. It therefore remains rather unclear what their specific meaning and their advantages and disadvantages are. It would be interesting to know, if all indicators are based on the seven-level monthly indicators for temperature and precipitation, which are included in the tambors.org database from 1500 onwards, or if additional data and information included in the database has been used. The development of the Historical Precipitation Index seems to be the key result of the manuscript, however, its development is described in one sentence only (lines 161-163). More detailed information is necessary here. The advantages and disadvantages of the developed indicators should be discussed.

2) I don't think that the droughts always affected whole of Germany in the same way. Thus, I doubt, that the indicators are continuously representative for whole of Germany. However, no information is given on spatial situation, how many stations are included in the calculation of the SPI, how are these distributed, how was the spatial aggregation undertaken? How representative for Germany is the HPI? How was spatial distributed information dealt with?

3) It is additionally unclear for what the presented drought indicators can be used and what analyses can be based on the developed time series. The calculation of these indicators should be complemented with analyses of the time series and their interpretation. It is quite strange, that the results and discussion section is rather a review and quite descriptive text only loosely connected with the indicators described in the methods section. I suggest to re-write the results section completely. It should present analyses of the developed indicators and time-series and their interpretation.

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4) Also the outlook section is only very loosely connected to the rest of the manuscript. I suggest to completely re-write this chapter. It should rather contain ideas of how to further analyze the developed indicators and/or how these can be analyzed in combination with other drought information. Maybe, a conclusions section would be more relevant.

Further comments:

Introduction

Lines 20-23: These statements should be underpinned with references.

Lines 28-30: Statements could be more specific. Long-term reconstructions of what? Why are long term reconstructions necessary from comprehensive risk assessments? Century long time-series are not really necessary for comprehensive risk assessments, rather for temporally dynamic risk assessments.

Lines 41-46: the statements should be underpinned with references.

Lines 47-53: It would be interesting to know, which drought indices are characterising which drought type. If this is introduced in the introduction, this could be picked up later on for the new indices presented in the study, so that it becomes more clear for what the different indicators can be used.

Line 65: Please clarify to which phases you refer here. This is rather unclear.

Data

It is not fully clear to me, if all information/data described in this section is used for the analyses of the manuscript, maybe some more information which data/information has been used for what might be helpful.

Lines 98-101 This paragraph fits better into the introduction.

Lines 117-118. The equation for the calculation of the SPI should be provided or at

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least described in more detail how it has been calculated and on which data specifically. "Official precipitation values for Germany" is not specific. How many stations? Daily values? Spatial aggregation etc. Or was the SPI calculated already and available in the database. This becomes not fully clear here.

Line 182-183: It remains unclear how the monthly PIs were summed up to the HPIs and how these were transformed into SPIs.

Is the MDI available in the database tambors.org?

Lines 188-190 it is not clear to me how the HDI was calculated on basis of the HPI. Please elaborate on this and explain better.

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Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2019-104>, 2019.

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