

## ***Interactive comment on “Reassessing long-term drought risk and societal impacts in Shenyang, Liaoning province, Northeast China (CE 1200–2015)” by LingYun Tang et al.***

### **Anonymous Referee #3**

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This is a well written paper investigating the drought history and impacts in Shenyang, China, for the past 800 years. This is a worthwhile endeavour which has been approached in a rigorous manner; it fills gaps in our knowledge, since much work remains still to be done in this region. The paper presents an extensive part on data description, method of data processing, and drought identification/definition. However, the part on results and analysis is very short and almost exclusively focuses on the period post 1880/1900; this gives the paper the character of an introduction and seems as if the potential of the data has not been fully realized.

Specific comments: 1. As stated it is a fundamental problem of the paper that the

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section of results and analysis are not more comprehensive. This part is very short in relation to the room dedicated to methods, processing and identification.

2. The title of the paper implies an analysis of droughts and their impacts from 1200 to 2015. However, the paper almost entirely focuses on the period 1906-2015.

- The analysis of drought classification and trends for the period before 1906 is very short. Trends in this period are hardly explained; the high in drought frequency around 1500 is shortly addressed, but the sudden and massive increase in drought reports after c. 1880 is not contextualized. Is this skyrocketing of drought frequency and severity real or due to data survival or changes in the nature of the documentary sources employed? If the rise in droughts is not linked primarily to data availability and nature, is there an explanation for it?

- This veritable explosion in drought frequency and severity around 1880 highlights the general problem of the availability, reliability and nature of the documentary information; the problem increases in general the further back in time one goes. The authors state 'such volume [of information] limits the capacity for cross checking and validation, with many sources not easily accessible. This has raised questions of reliability and transparency, but as Bradly notes, the compendium produced by Zhang clearly illustrates critical analysis, with careful checking for consistency and discrepancies identified.' (p. 6 lines 164-168) and 'great care was undertaken in assessing the historical record' (p. 7 212). This is all rather vague and gives no indication of the measures actually taken to ensure data quality. Compilations of past weather information are notorious; older ones are marred by problems with misdating, doubling, misallocation and general misunderstandings. Zhang's compilation is younger, but the reader is not informed, how its validity was verified. Since the majority of the study period is covered by documentary data alone, this is a question of high significance.

3. In the section on drought vulnerability, impacts and reaction are studied on the example of two 20th-century droughts. These are fine, but it would be beneficial to add

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a more systematic summary. Information on earlier droughts would help to complete the picture.

4. On occasion the paper appears deterministic, as in 'Drought can be considered as the most disastrous natural hazard within China, with over 465,000 deaths and more than 3.1 billion adversely affected from 1970-present and 12 million deaths since 1900' (p. 4, lines 93-95). The impact of droughts – in its most severe form famines or epidemics – is not merely due to the meteorological stressor, but is also formed by socio-economic, political and institutional structures, which can raise or reduce vulnerability, especially the mortality rate, considerably.

5. P. 4 lines 98-99: 'Between BC 206 and AD 1948, 1056 severe droughts are recorded in Chinese history.' Almost half of this period is classified as 'severe drought' in this phrase, this is a very high percentage. Hence either the definition of 'severe drought' within the (diverse) Chinese climate, or the number of 'severe droughts' needs to be reconsidered. Possible shifts in the geographical extent of China over this long period of time also need to be considered.

6. P. 4 lines 101-104 mentions early Chinese precipitation records. A short explanation on these observations could be added since many readers will not be familiar with this subject (persons or institutions carrying out the observations, mention of types of instruments used if not the 'normal' rain gauges.)

7. The paper needs to go through language editing for minor orthographical and style problems.

8. Fig. 6. This figure is somewhat confusing. Fig. 6B probably is for the whole study period 1200-2015 as is Fig. 6C, but the axis of Fig. 6B is not labelled and hence the time scale is unclear.

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