

Interactive comment on “Historical droughts in the Qing dynasty (1644–1911) of China and the role of human interventions” by Kuan-Hui Elaine Lin et al.

Anonymous Referee #2

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GENERAL COMMENTS This article discusses historical droughts and the role of human interventions in the Qing Dynasty (1644-1911) of China based on the REACHES database, which was created using the “Compendium of Meteorological Records of China in the Last 3000 Years”. The main purpose of this article would be an analysis of long-term variations of droughts and their impacts on human society in China during 1644-1911. Although the methodology used might be somewhat innovative, the results were not so new and interesting as compared with a lot of previous similar papers analyzing the changes in climate and natural disasters in China during the historical period. Also, another problem of this article is that four authors of this article are the same as those of the main referenced paper by Wang, P.K. et al. (2018) which introduced the construction of the REACHES database. For most of the readers of

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this article, the REACHES database might be unfamiliar and unrecognized. Therefore, authors should explain the REACHES database in detail at first using visual diagrams and charts, such as shown in Wang, P.K. et al. (2018). However, this article would be acceptable for publication after minor revisions.

SPECIFIC COMMENTS I. Introduction

P.2 Line 26: Studying past drought and humidity » Studying past drought and flood After this sentence, previous related papers should be referred to. Line 34: documented records » historical documents (e.g., ****, *****)

P.3 Line 30-31: Three-, five-, ——— is the most commonly practiced method (previous articles should be referred here), so that ———

2.Data

P.5 Line 22: The data source of this study mainly comes from REACHES database —> This is an ambiguous expression. "mainly" should be replaced by "mostly" or "basically".

P.7 In Figure 1, the scale on the horizontal axis should be expressed as "1650 1660 1670 —", not as "1644 1654 1664 —". This is the same for other figures; Fig.2, Fig.3, Fig.4. Strangely, Figure 5 on P.14 has no time scales. As for the time scale, Figure 7, 8, 9, 10, and 12 are good, but Fig.11 should be corrected.

3.Methods

P.9 Line 1 - 8: In this paragraph, the term "drought" is defined as divided into "meteorological drought" and "hydrological drought", but the distinction between the two is arbitrary and lacks objectivity. Authors should give some text examples of meteorological droughts and hydrological droughts in the "Compendium of Chinese Meteorological Records of the Last 3000 Years", by citing specific sentences.

P.1 Line 12 - 14: The term "Paoshan" should be defined; What's the difference

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between "Paoshan of Shanghai City" and "period of Paoshan" ?

Line 23: "On very data" » "On every data"

P.11 Line 31: (1832—) » (1833—)

4.Results

P.12 Line 15 - 17: In figure 4A, the authors mention that "If taken drought variable as a major concern, there is only one spike around 1720 in the earlier half of the 18th century and some increasing frequency around 1730-1750.", this expression is subjective and inaccurate, especially for the term 1730-1750.

Line 17 - 23: This paragraph includes serious problems concerning the comparison between the time-series of multiple variables for droughts and the Northern Hemisphere temperature anomalies, as there exists a large difference of spatial and temporal scales between them. If the authors would discuss the relationship between the drought frequencies in China and the Northern Hemisphere mean temperature anomalies, reasonable explanations for the peak of drought frequency and the NH mean temperature anomalies in terms of anomalous atmospheric circulation patterns which might cause surface drought conditions in China.

P.14 The description of colored lines drawn in Figure 5 is not specified, except for Famine, Crop Failure and Socioeconomic turmoil. Also, the scale of the year on the horizontal axis of the graph in Figure 5. is completely missing.

P.14 Line 14 - P.15 Line 6: The description in this paragraph is arbitrary and less objective. For example, the authors identified six severe drought periods, but no explanations for the specific selection criteria can be found. In case of the period 1720-1740, the drought frequency in the 1730s was apparently lower than in the 1750s (Fig.4A) . So, please mention clearly the specific selection criteria for 6 severe drought periods.

Figure 6 (P.16-18): The size of the legend on the left in figures is too small to recognize. These should be more expanded for the readable size.

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P.20 In Fig.7 and Fig.9, population changes should be shown as a line graph, not as a dotted graph.

Line 19: The authors mention that "the population of Jiangsu showed a downward (Figure 8)", but no population graph can be found in Figure 8.

P.22 Line 19: expended » expanded

P.26 5.Discussions and conclusions Line 18: metrological » meteorological Line 21: dry » dry conditions

P.27 Line 22: while » which ? Line 23: between it » between them ? Line 35: drought though can be → though drought can be – ?

P.28: Line 30: in the 1665-1991 » in the 1665-1911 ?

P.29: Line 11 - 13: In this paragraph, the authors pointed out that "Moreover, this illustrates the importance to separately deal with drought and flood events instead of integrating them into one single index as practiced in many previous studies". Probably, the authors did not read at least two important papers below; the former article analyzed the spatiotemporal variations of droughts and floods in China during the historical period based on statistical analysis, and the latter article reviewed historical climate records in China and reconstruction of past climates. The authors should discuss by citing and referring these valuable papers.

Wang, S.W., and Z.C.Zhao, 1981: Droughts and floods in China, 1470-1979. in "Climate and History" T.M.L.Wigley, M.J.Ingram and G.Farmer (eds.), Cambridge University Press, 271-288.

Zhang, Jiacheng and T.J.Crowley, 1989: Historical climate records in China and reconstruction of past climates. *Journal of Climate*, 833-849.

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