Climate of the Past Discussions

Clim. Past Discuss., referee comment RC2
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Comment on cp-2021-168

Anonymous Referee #2

Referee comment on "Documentary-based climate reconstructions in the Czech Lands 1501–2020□CE and their European context" by Rudolf Brázdil et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2021-168-RC2, 2022

The paper is interesting in that it (i) gives a synthesis of weather and climate changes in the Czech Republic in the period 1501–2020 based on documentary evidence and instrumental observations, (ii) tries to describe the main causes of climate change in this time using statistical attribution analysis (regression and wavelet techniques), and finally (iii) investigates spatiotemporal relationships with gridded European climate reconstructions. All three of these topics are very important for scientists interested in historical climate reconstructions, and especially in those based on documentary evidence.

To be published in the journal, however, the paper needs some substantial improvements and corrections, propositions for which are listed below:

Major weaknesses:

- In many places the paper has too much of a descriptive character. For example, page 6, lines 4–21. It is very difficult for the reader to follow the text and even more difficult to identify the main findings.

I suggest making a Table showing warmest, coldest, wettest and driest 30-year periods, or maybe even the three warmest, coldest, etc. periods for all indices.

- I suggest taking into account other additional NAO reconstructions: for winter, for example, it is possible to use the index recently proposed by Cook (Cook E. R., D'arrigo R. D., Mann M. E., et al., 2002, A Well-Verified, Multiproxy Reconstruction of the Winter

North Atlantic Oscillation Index since A.D. 1400, J. of Climate, Vol. 15, 1754 – 1764, Cook E.R., 2003, Multi-Proxy Reconstructions of the North Atlantic Oscillation (NAO) Index, A Critical Review and a New Well-Verified Winter NAO Index Reconstruction Back to AD 1400. In The North Atlantic Oscillation, Hurrell JW, Kushnir Y, Ottersen G, Visbeck M (eds)).

- Generally, all four drought indices are well correlated (Table 1), and I therefore suggest limiting their number to two indices. The text describing the results will be more concise and readable. The best choice in my view is to use SPI and SPEI. SPEI is the index best correlated with temperature and precipitation in all seasons, and, moreover, only this index was independently reconstructed for the Czech Republic using phenological data.
- In the Discussion section a comparison of the obtained results against other similar climate reconstructions of local and regional character available for the central and other parts of Europe should be also presented.
- The attribution analysis must be done separately – for pre-instrumental (reconstructed series) and instrumental periods at least. For example, for the periods 1501–1800(50) and 1801(51)–2020. It is obvious that until about the mid-19th century climate changes were caused mainly by naturals factors (volcanic and solar forcing). Anthropogenic factors (mainly greenhouse gases) are important only for the industrial period and therefore should be limited to this period.

Minor weaknesses:

- 5, line 39 – please explain the reason for such a big change in correlation coefficients (from about Ë□0.7 to 0.0–0.2, Fig. 2a) around 1900 between all studied series. What happened at the end of the 19th century and the beginning of the 20th century that the correlation between temperature and other variables was lost? Is this a problem of loss of homogeneity of temperature or precipitations series?
- 8a – a similar problem to that mentioned in point 1: please explain the reasons for the loss of correlations between the two reconstructed temperature series only just after the mid-17th century and mid-18th century for two–three decades.

Could you also inform the reader which of the temperature reconstructions presented in Fig. 8a is better and more reliable (based on temperature indices or on wheat harvest dates). Differences in absolute values of temperature are sometimes very large. This is very well seen particularly in the aforementioned times when the correlation is lost.

- 8 – the same scale should be used in Figures 8a and 8b for temperature in both types of reconstruction comparisons, i.e. four degree distance between lowest and highest values.
- Figs 14 and 16 – for winter you can compare your results with Luterbacher et al. (2010) similar calculations made for Poland area and Europe using also modelling

works: Luterbacher J., Xoplaki E., Küttel M., Zorita E., González-Rouco J. F., Jones P. D., Stössel M., Rutishauser T., Wanner H., Wibig J., Przybylak R., 2010, Climate Change in Poland in the Past Centuries and Its Relationship to European Climate: Evidence From Reconstructions and Coupled Climate Models. in: Przybylak R, Majorowicz J, Brázdil R, Kejna M (eds) The Polish Climate in the European Context: An Historical Overview, Springer, Berlin Heidelberg New York, 3-39.

- I suggest reducing the number of figures and presenting more possible explanations for peculiarities in the course of climate change in the Czech Republic in the study period.

I can recommend acceptance of the manuscript for publication in the *Climate of the Past* only on the condition that the remarks and suggestions listed above are satisfactorily taken into account.