Climate
of the Past

Discussions

EGU

Interactive comment on "Proxy surrogate reconstructions for Europe and the estimation of their uncertainties" *by* Oliver Bothe and Eduardo Zorita

Anonymous Referee #2

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This study is an interesting contribution to the field of climate reconstruction because it adds and compares multiple way of uncertainty estimation to the widely and successfully used analog reconstruction methodology. It fits very well to the scope of Climate of the Past. Hence, I suggest publication after revisions that should make the structure clearer, condense the results including figures with time series and after putting the focus a bit more on the novelty of the uncertainty estimation than on the reconstruction.

Comments:

Introduction

- Would be worth mentioning the just published global reconstruction by Neukom et al.

2019, which includes an analog approach, too.

- I would find a list of the content helpful at the end of the introduction, saying that three approaches are tested: 1. best analog only, . . .

- Page 2, line 20: "guestimate" is colloquial language

Methods

- The entire structure of the study and the used error estimation should be made clearer. Can you add a schematic diagram?

- Explain clearly how you come to your three reconstruction experiments, into which the results are separated. I assume the number 39 for the minimal number of analogs in 2003 (page 5, line 20) is the reason for having 39 in section 3.2 but that is not clear to the reader.

- Page 4, line 23: "under certain assumption" Which assumptions? Please write more precise.

- Page 4, last two paragraphs: I would rather put the equations more prominent in separate lines and not in the middle of the sentence because understanding the error estimation is crucial for this study.

- Page 5, line 6: modified

- Page 5, line 15: "dates" You have not mentioned yet that you reconstruct JJA averages at annual resolution

- Page 5, line 15ff.: How do you choose the noise SD levels such as 2.57? And why if you write in line 22 that only the 1 SD criterion gives a reasonable number of analogs?

Proxies

- Is there a reason to use the gridded CRU data for proxy correlations here and the BEST data later in the paper?

- You could explain that the correlation of the excluded location in Slovakia are low because trees are limited to temperatures in another season. Otherwise it seems strange, why they appear in the PAGES data base. However, I am not sure why the Albania chronology with weakly significant negative correlation appears in the PAGES collection. Maybe, it has been removed in the more strictly screened version 2 of the data base? Having this negative correlation in mind, I do not understand why it is used for comparison/verification later in the paper? I would not expect a good match/positive correlation in the analog reconstruction.

Model simulations

- Page 7, line 5: Please explain again briefly why the "similar internal variability" of the simulation is important instead of referring to the previous section

Results

- Generally, try to shorten the results section and have a clear and consistent structure for the three experiments. I would put more focus on the uncertainty results than the reconstruction itself.

- Make clearer, how the three experiments compare and later in the discussion what we can learn from this.

- Page 9, line 2: why is the plot relative to Euro-2k and not relative to instrumental data?

- Fig. 3: It is not surprising that the analogs fit better, where you have spatial proxy clusters than isolated locations. I have not seen this discussed in the paper.

- Page 11, line 26: It is good that the analog reconstruction generally agrees with previous statistical reconstructions but they are not a reference and it is unclear which ones are closer to reality. Rather just see if they are in your uncertainty range.

- Page 14, line 30ff: Have you considered weighting the analogs with respect to their distance?

- Page 15, line 5: "visually there is good agreement" Not clear what you are talking about, other series besides Tatra and Albania?

- Page 15, line 29: Add reference to figure

- Page 15, line 35: How can you have a stronger 20th century warming trend in the reconstruction than in observations and at the same time have trouble to find analogs for exceptionally warm years such as 2003?

- Page 16, line 9: If you look at the temperature evolution after individual eruptions, this is not a superposed epoch analysis.

- Page 19, line 14 and Fig. 8: Why do you show a mean and not the median in this case? The mean should be influenced by the number of averaged analogs and the numbers are highly different in this case.

- Page 19, line 28ff: Why is the comparison with instrumental data just done for the 1 SD reconstruction?

Concluding remarks

- Please avoid 1-sentence paragraphs

Figures

- Generally, please think of a way to reduce the number of figures with time series. Both, the number of really necessary panels in each figure and figures in total. E.g. it is probably not required to see the annual resolution reconstruction for the full period for all three experiments or do multiple smoothing have to be presented?

- I find the uncertainty ranges often impossible to see (e.g. Fig. 2a). I cannot recognize the "envelope", you are talking of. As this a main focus of the paper, please try to find a way to plot uncertainty better visible, e.g. just a smoothed version for the entire period and a subperiod at annual resolution.

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