

Interactive comment on “Spatio-temporal variability of Arctic summer temperatures over the past two millennia: an overview of the last major climate anomalies” by Johannes P. Werner et al.

Anonymous Referee #1

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The authors present a new Arctic summer temperature reconstruction over the past 2,00 years using a Bayesian reconstruction technique. The paper discusses and thoroughly analyzes this new Arctic temperature reconstruction. The method and analysis seem sound and consistent. I just have one large concern in reading the manuscript: I didn't get a sense that it was addressing any particular scientific question and it was hard for me to see where the paper was going scientifically. I think the authors have produced an important and valuable reconstruction, but I think having a more specific direction or question to address would make the paper much more interesting and useful. It's not obvious, to me at least, that a paper devoted to “an overview of the last major climate anomalies” would garner a lot of interest, especially when it is primarily

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about one particular reconstruction. Perhaps the paper might be better focused around an issue like their findings that contemporary warming doesn't conclusively supersede the MCA peak? There's plenty of material here to tell an interesting story, but I don't think any coherent story is being told. The authors do have some interesting analysis discussing the finding I just suggested that could be used to focus the body of the text as well as focus the somewhat vague title. I would recommend (though not absolutely insist) that the authors focus the paper on one or two specific scientific/climate questions.

Minor points:

Abstract, lines 1-2: I think you need to be a little more clear about what is actually unique here. I understand that it is BOTH spatially resolved AND millennial in length, though there are several reconstructions that are one or the other.

Paragraph including lines 53-60: This paragraph comes across as a kind of special attack on the glacier advances work in a tone that I'm not sure the authors intended. This summer temperature reconstruction (with skill primarily over Europe) is really different than a glacial reconstruction given the memory of glaciers, the different seasons and climate factors a glacier is responding to, etc. So I don't think a clear declaration against that work is necessarily warranted.

Line 72: define LOC

Lines 124-125: Need a more specific criticism here or not discuss the issue at all. What constitutes a "strange" correlation? And on what firm basis can you reject the use of the BE product?

Lines 147, 444: Question mark issues.

Lines 199-202: How are the response parameters being determined? Do your reconstructions happen to take account of the specific choice of parameter values?

Lines 211-222: I think it's important to note that only Europe has spatially coherent

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skill, otherwise it's fairly patchy skill (at least in my reading of Fig. A1).

Figure A1: It wasn't clear to me what is meant by "CRPS CE" and "CRPS RE"? As a related issue, CRPS is challenging to interpret because it doesn't have a reference. Perhaps use the skill score version of CRPS that takes account of a reference (e.g., your prior)?

Fig 2b: Why is there so much precision right up to the end of the calibration interval, but a complete loss of annual precision from 1980 to the present? Are important proxies dropping out here?

Figure 5: no color on the color labels

Lines 458-459 "which gets sparser going back in time"

Line 5:14 "used for these chronologies"

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