

General remarks

The paper is a comprehensive study of the 2018 west-central European drought focussing on soil wetness deprivation, and what that drought would have been like in a world with different levels of climate change using the pseudo global warming method and analogues. The study is technically rich, as the analysis is done with different global climate models for input to the regional model providing a cross-check for the results, as well as content-wise rich with comparison to other drought events and a climatological test of droughts in this region and elaborate placement of their findings in existing literature.

I find this research very relevant as it produces new insights in the attribution of European droughts. The analysis of the drought is well executed and technically sound, including temperature, precipitation and evaporative demand. Limitations to the analysis are also reflected on accurately. The paper is lengthy, though, and could benefit from a reduction in size (I have tried to provide some small suggestions for this in the minor comments below). The English language is of high quality and the paper reads well.

Detailed remarks

You have used “(not shown)” six times in this paper (L221, L235, L276, L279, L329, L340). This is too often and becomes a hindrance since it implies a demand of trust. Either show what you claim, rephrase, reference to a paper that proofs a comparable outcome to the one you found, or delete the claim. Please try to reduce the “(not shown)” to one or two times. Since you have a large appendix already, you might consider placing some of these aspects in the supplementary material to prevent the paper from becoming larger.

Not all graphs are easily readable. I reviewed using a print-out and could not read Figure 1 and Figure 5a, and to some extent Figure 3. I have put a more detailed explanation below, but would encourage giving figures a check-over for readability.

Minor comments

- | | |
|----------------------|--|
| L52-L56 | This is 1 very long sentence. Please shorten for ease of understanding. |
| L67-L69 | This sentence could use a reference to back up the claims. For the Mediterranean precipitation research, you could cite Zappa et al., 2017 (http://dx.doi.org/10.1175/JCLI-D-16-0807.s1). |
| L99-L100 | Is your study trying to provide something like the ‘common framework’ published by Shepherd et al., 2016? (http://dx.doi.org/10.1007/s40641-016-0033-y) |
| L132-134 | You are altering a large number of variables to create the counterfactual worlds. Could you argue why it is acceptable to meddle with the model to such a large extent without losing physical self-consistency? In essence, you are altering the consequences of climate change (T, P, SH, etc.) instead of (only) the causes of climate change (GHG, SST, etc.). I am aware that the method requires this to create a counterfactual world, but I would like to hear the validation in 1 or 2 short sentences (could be in discussion you find that a better fit). |
| L145-146 | Please add the resolutions of the individual EC-EARTH v2.3, HadGEM2-ES and MPI-ESM-LR GCM’s. |
| L169-173
Figure 1 | The reader might benefit from adding an equation to show this second step as well. The b panels are not readable at all, please change colours and either make the graph bigger or lines a little thinner. Ep is not mentioned in the caption. The legend in the b graphs is incomplete (shading is not mentioned, for instance). |
| L203 | I do not believe the pressure anomalies are shown? Or are they the once in the supplementary material? Please refer if that’s the case or show what you are claiming or reference to a paper that shows it. |

- L261 The reader could benefit from adding which colour line to look at when referring to Figure 3a. Also, to add which colour to look at with “mean response is rather large...”
- L266 “increasing cloud cover...” is not shown anywhere, or do you mean an interpretation of solar radiation in Figure 3b? Please clarify.
- L282-L283 Figure C1 and C2 show vastly different GPH z500 patterns. Should this be mentioned or explained? Is this of significance for the analysis?
- Figure 3 The legend is incomplete, please also mention what the shading etc. stands for. The caption is a bit of an essay. I would suggest placing the method part that right now is at the end of the caption, including the equation, to the main text or supplementary material. From a print the graph is difficult to read, which is a pity since it shows some essential and interesting things. You could either make it bigger or reduce the thickness of the median (black or red).
- Figure 5a The lines are almost all the same colour, and too thick to interpret. There are even two lines that are both red. Please update the graph, make the lines thinner or the graph bigger, and choose colours that are further apart from each other. The caption is again a bit of an essay with a method at the end that could be explained in the main text or in supplementary material.
- L395 Just to make sure, is the comparison with E-OBS done by the paper you are citing in the previous sentence? I was trying to find a graph that shows the comparison, but if it is in that paper, please clarify this in the sentence (“the authors found...” or something like that).
- L490-496 I do not think you need to state the obvious, plus you are not testing these impacts in this paper. You could save space by deleting this section.
- L510-L516 (*optional*) You could add spectrally nudged storylines to the list of options, it will allow for drought intensification studies, but not changes in dynamics (which you claim in L571-573 is plenty) with the benefit of a very small size ensemble (van Garderen & Mindlin 2022, <https://doi.org/10.1002/wea.4185>). However, since I am the author and it is for a region outside of Europe, feel free to ignore this comment.
- L521-525 Could it be that the discrepancy has anything to do with altering symptoms of climate change and not causes? See also my comment for L132-L134
- L543-545 In the absolute sense the referencing is correct, since the papers do mention analogues as well. However, storylines and analogues are not the same thing, and the emphasis of the paper cited is on storylines. Perhaps succinctly place the analogues in the context of storylines without doing another literature review (which you have already done).

The comments I made are minor, and I am looking forward to seeing this paper published.

Best,

Linda van Garderen