Comment on wcd-2022-9
Anonymous Referee #2

The paper uses circulation analogues to determine to what extent recently observed extreme events may be influenced by the warming between the first half of the ERA data since 1950 and the more recent period. The analysis is well conducted and the results are explained well. I clicked major revision because I feel quite strongly about some of my comments. Overall, I really enjoyed reading a careful analogue analysis of several interesting events and once the concerns of the reviewers are addressed this will be a very nice addition to the literature. (note I made my comments first and then checked what the other reviewer commented)

Major issues that need to be addressed

1) the way IPCC conclusions are referred to in the introduction is very misleading. I read some of the referred to conclusions with surprise. I think the only way to sensible quote IPCC conclusions is to quote them verbally and in "". everything else can be misleading and does an injustice to the assessment process and approval plenary process. So this section needs to be reworked, clarifying what conclusions are IPCC conclusions and what the authors infer based on their reading. I note that the previous reviewer requested this as well.

2) There is some statistical lack of rigour in some of the statements. Firstof, as you say, the human influence is not 0 in the first part of your analysis period, and secondly, decadal variability can be important on the timeline you investigate. You need to acknowledge this more clearly in conclusions and you also need to discuss this as a caveat more clearly. nothing in your analysis allows you to determine if a change is anthropogenic, natural, or decadal variability. Some changes you see are consistent with well understood trend attribution results (which you could refer to, and that is what the US National academies report 2016 on event attribution recommended!) you should do this a bit more. examples are warming and moistening on large scales. But in some cases there is no way to know and you should acknowledge that. Also some statements are
phrased rather absolute for example the change in seasonality in events which based on the diagrams shown look quite tenuous.

3) I am a bit nervous about using analogues across all seasons. the feedback to hot extremes, for example, will be different in the hot season, as will be the influence of SSTs. Also discussion of circulation variability between the periods is highly uncertain. this needs to be reworked a bit, and unless you have tested (considering decadal variability!) if a change is significant you need to be careful. i think at most you can conclude that there is a significant difference between your analysis period, but you can’t attribute it to forcing or variability. But i am not sure you can even conclude that in some cases where you state it.

4) i am not sure about the discussion of probabilistic event attribution vs your approach. the observations only approach is very useful and complementary to the big model based pdfs but you shouldn’t claim that these do not take into account the processes leading to the events. It almost sounds like you read no paper from the modelling approach side - they usually analyze synoptic situation and discuss contributions. I feel quite strongly this needs to change as the discussion of event attribution approaches has been surprisingly emotional in the literature, advocating the chosen approach by misrepresenting what people using other approaches do. This is unscientific and unhelpful. I find the world weather attribution approach nice as it uses multiple approaches and gains strength from doing so.

Minor comments

Title: this really deals with European extremes and one American extreme. At most, this is about extratropical NH extremes. Given the publication bias towards developed world extremes you should not use a title that implicitly claims this to be a global analysis - a lot of extremes have occurred elsewhere and you are not talking about those.

p. 1 l 10 i think its analogues? not analogs - this may be elsewhere

p. 2: the introduction absolutely needs to change please - either quote papers for your summary of what they say, or the IPCC chapters verbatim. dont put words into the mouth of the ipcc.

p. 2 l 35 and following paragraph: the first event attribution study was Stott and coauthors on the 2003 heat wave and needs to be cited. same page line 39: this is not
true for most studies. have you read them? there may be some simplistic model pdf vs model pdf analyses published in some cases but generally the good papers also on the model attribution side analyze the event and its factors.

p. 7 l 157 two factuals countering each other.

p. 10 l 224: are you sure there is a significant shift? if yes, you need to state between your two periods nobody knows what its due to

p. 23: the analogues for the medicane are very poor fits so isnt this a case where maybe even more caution is needed?

p. 25, bottom two lines: i am not convinced about this. see general comments.

bottom page 27 ditto - is this really significant and against what?