In this study, Otero et al. examine the impact of atmospheric blocking on the ozone and temperature as measured at 300 stations across Europe during the period 1999-2015. The authors apply a copula-based method to model the probabilities of extreme temperature and ozone under blocking and non-blocking conditions. The approach allows the authors to examine the impact of blocks on the joint probability distribution of these two variables. The results show that blocking increases the probability of co-occurrent ozone and temperature exceedances by 15%-20% at the stations in central, north-west and east of Europe. The probability of combined ozone and temperature extremes under non-blocking conditions is small everywhere.

The authors did not adequately address many of the criticisms from the reviewers. In some cases, the authors addressed the reviewers' comments only in the response document, and not in the text itself. This means that only the reviewers will see the authors' reasoning, and not the general readership. The paper should acknowledge the limitations pointed out by the reviewers. I recommend major revisions.

Main criticisms.

1. Reviewer 1 stated: "I assume that the authors treat all days equally in their distribution (e.g., in line 177/figure 2 for the exceedances of the 95th percentile of temperature). To me this is flawed as the authors consider the months April-September and the probability for temperature extremes is not equally distributed across these months. So, e.g., days in July are way more likely to be in the upper tail (even if they are not exceptional), while this might even be impossible for days in April. This should to be clarified and/or resolved."

The reviewer has raised an important point. The authors address this point in the response, saying, "We agree with the referee that temperature extremes will be in the upper tail more likely in July or August than in April." But the authors have not revised the text sufficiently. It's true a new sentence has been added: "For both variables, we have calculated the anomalies with respect [to] their corresponding climatology during the ozone season (i.e. April-September) for the whole period of study 1999-2015." But does this mean that daily anomalies were calculated – e.g., the anomaly on April 1, 2015, at a particular station relative to all April 1 data at that station? In fact, both reviewers were confused about the construction of the anomalies.

What I think the authors mean is that the anomalous temperature and ozone values were calculated separately for each ozone season, with the 95th percentile of each variable comprising the highest ~10 daily temperatures and ozone concentrations during the 183 days between April 1 and September 30. Is that right?

Importantly, the authors also need to acknowledge in the text the weakness of their approach to construct anomalies, as pointed out by Reviewer 1. They should provide (in the text) their rationale for applying this approach despite its weakness.

2. Reviewer 2 asked for greater clarification on how this paper builds on previous work. The revised text does indeed begin to address this request. Can the authors also say that the copula-based approach allows a quantification of the probability of joint exceedances?

3. Reviewer 2 also asked for some discussion of the drivers of the spatial patterns of the relationships between blocking conditions, ozone, and temperature. The authors responded that this was beyond the scope of the text, saying "Since the present study employs purely statistical techniques, mechanistic explanations for the effects cannot be produced, but this remains an interesting topic for future work." I disagree. There exist many papers relying on statistics that also offer mechanistic explanations for results. The literature is there – e.g., Ordonez et al. (2017) and Sousa et al. (2018). What accounts for the spatial variation in the drivers of high ozone and temperature? Are there other drivers besides blocks for extreme ozone or temperature events? There is some discussion of subtropical ridges but it is hard to follow. The reader is curious and seeks more than just a reporting of results.

An example of text that provides insufficient interpretation is the following (Lines 318+): "However, we found a significant increase in the conditional probability over the north-west stations and a slight increase over the central-east stations [Figure 5f]. This suggests that over such regions ozone extremes tend to occur given high temperatures which are strongly connected with atmospheric blocking. This is likely due to the position of the block during the ozone season covering spring and summertime when the increased solar radiation lead to warm temperature in the blocked regions." Where exactly is the block position? Wouldn't the relationship of high temperatures leading to high ozone hold true throughout the domain? Figure S1 shows the frequency of blocks during the ozone season, but that is not the same as "the position of the block." In any event, the pattern in Figure S1 is not similar to that in Figure 5f. Finally, does the duration of the blocks have an impact on the copula results?

I recommend that Section 3.1 (Impact of atmospheric blocking on ozone and temperature) and Section 3.2 (Copula results) each begin with a detailed description of the results and then conclude with a short paragraph interpreting the results for that section. The interpretation would include an account of spatial variability of all results. There exists sufficient literature for the authors to begin to interpret this spatial variability, though there will also likely be gaps in our knowledge. Citations to other papers should briefly describe the mechanisms that these papers suggest.

4. Reviewer 2 asked about the impact of trends on the results. In response, the authors again state that "For both variables, we have calculated the anomalies with respect [to] their corresponding climatology during the ozone season (i.e. April-September) for the whole period of study 1999-2015." As stated in #1 above, I think that means that the anomalies are calculated with respect to all values recorded during each ozone season separately (and not in fact over the "whole period of study").

In any event, if trends in either ozone or temperature have occurred, then the extremes may become more (or less) extreme over the 17 years of study, and that could muddy the relationship of blocking conditions and these variables. For example, Yan et al. (2019) find a rapid decline of relatively high ozone concentrations from 1995-2012, especially in rural areas. At the very least, the authors need to acknowledge these trends in the text and consider the impact of these trends on their analysis.

Yan, Y., J. Lin, A. Pozzerc, S. Konga, and J. Lelieveld (2019), Trend reversal from high-to-low and from rural-to-urban ozone concentrations over Europe, Atmos. Env., 213, 25-36.

5. Reviewer 2 commented that lapses in English occur with a frequency of 4-5 per page. These lapses are still there – e.g., "especifically," "the probabilities associated to…," improper use of "with respect" and "allow to," "Artic," "bock," and many others. The authors should employ an editor to fix these minor but distracting errors.

6. Reviewer 2 commented that Figure labels are too tiny to read. They continue to be too tiny, both in the main text and the Supplement. For example, the tiny B=0 and B=1 text at the top of many panels is so small that it's easy to miss. Numbers and units beside the color bars are also tiny.

Minor comments.

Line 104. "The BI was computed through the Free Evaluation System Framework (see Richling et al. (2015) for more details), specifically with the single plug-in corresponding to the blocking-2d (Freva, 2017)." The average reader will not understand this sentence.

Table 1. There appear to be some typos in this table – e.g., in the Clayton equation.

Equations 2-4. The variables u and v should be defined here, not just in the Table.

Line 271-2. The text states: "For the COND probability, both the computation domain and the critical region evolve when moving along higher temperatures…" This is not clear. What is meant by "critical region" and "computation domain"?