

General Overview:

The authors analyze the hotspots for warm and dry summers in Romania using E-OBS and a regional dataset covering Romania. The authors intend to study the spatio-temporal variability and trends of hot and dry summers in the eastern part of Europe, focusing on Romania, between 1950 and 2020 and to study the relationship between the frequency of hot summers and the prevailing large-scale atmospheric circulation.

R: Thank you for your constructive evaluation of our study. In the revised version of the manuscript we will consider all comments and suggestions and we will improved the manuscript accordingly (see detailed responses below).

The manuscript fails in different aspects. Please find my major comments below:

- The authors should use in their analysis the SPEI over SPI. The SPEI is designed to consider both precipitation and potential evapotranspiration (PET) in determining drought. Thus, unlike the SPI, the SPEI captures the main impact of increased temperatures on water demand.

Vicente-Serrano et al. (2012)

R: The dispute SPI vs SPEI is not an easy one. When we drafted the study we wanted to use SPEI, but we decided for SPI for different reasons (see below). First of all, our aim was to compare a precipitation based index with a temperature based index. Thus, we have chosen SPI on purpose, because if we would have use SPEI it would have meant comparing a temperature based index with another temperature related index and we wanted to avoid this comparison. SPEI is strongly affected by the global warming signal, thus we have tried avoiding using it in our analysis. Since SPEI is highly correlated with temperature it is also, to a certain degree, already an indicator for a compound event. Nevertheless, following the suggestions of all the reviewers involved in the review process of our manuscript in the revised version we are going to perform and show the same analysis by considering also SPEI.

- I don't understand the use of ROCADA database. One can argue that ROCADA use more weather station in the computation of the gridded dataset and therefore finer spatial scales will be resolved. However, throughout the manuscript it's not clear the different between EOBS and ROCADA neither the conclusion is different when using one or another. Therefore, I would go with the long-term dataset EOBS.

R: We have added also the results of ROCADA dataset mainly because in previous studies we got complains that EOBS might not be suitable to make studies in Romania. But in the revised version of the manuscript we are going to remove the information and figures regarding the ROCADA dataset.

- Section 3.3, this section intends to analyze the compound events in terms of hot and dry extremes. Are $SPI < -1$ really extreme? I don't agree with the method used for defining compound event. They are only based on a month-to-month comparison and don't go into further detail. What led to what? Pre-conditioning of soil moisture probably plays a role in the major Heat waves in the region. Have the authors though in using bi-variate methods to analyze the compound events? Or even to do a lag analysis between the dry and month summers?

R: Regarding the SPI threshold, this is a common threshold used in similar studies. We consider a threshold of -0.5 to be not a good indicator because it will include too many “dry” years in our analysis and a smaller than -1 would reduce dramatically the degrees of freedom for our analysis. We fully agree with the pre-conditioning. In this respect, in the revised version of the manuscript we are going to include lagged and in-phase correlation maps between the two indices (SPI and HWDI) to be able to better argue why the combination of different months in defining the compound events. Moreover in the revised version of the manuscript we are going to show also the probability of occurrence of risk, conditioned on SPI (SPEI) and HWDI.

Zscheischler and Fischer, 2020 : 10.1016/j.wace.2020.100270

Ribeiro et al., 2020 : 10.1016/j.wace.2020.100279

- Section 3.4., there is some lack of novelty in analyzing the synoptic meteorological patterns of the specific drought years. No statistical significance is presented.

Sousa et al., 2021 : 10.1175/JCLI-D-20-0658.1

R: The anomaly maps for the case studies cannot have a significance field because it is just a snapshot for one event in time, thus we cannot perform any statistical significance. For the composite maps the significance of the anomalies is actually plotted in the figures (see figures S11 and S12 for example). It was a misfortune from our side that we did not write that clearly in the figure caption.

Regarding the comment “there is some lack of novelty in analyzing the synoptic meteorological patterns of the specific drought years”, we do not agree with it. Each region has its own particularities, thus the large-scale drivers have different spatial structures. Yes, of course a heat wave will most probably be driven by a blocking system, but this doesn’t mean that we have fixed and fully closed the issue of analyzing drivers of extreme events. Moreover, we have added also the stability maps in our manuscript (Figure 13) to further add some new info regarding the relationship between heatwaves and their drivers and we consider this is a new way to study this kind of relationship.

Therefore, all the changes need to be made, in order the paper goes for a second round of revision.

R: In the revised version of the manuscript we are going to try to take into account all the aforementioned suggestions.