Editor Decision on “Identification of Droughts and Heat Waves in Germany with Regional Climate Networks” by Gerd Schädler and Marcus Breil from 23 Mar 2021

Dear Christian Franzke,

thank you for accepting our paper. Please find our answers to the second round of reviewer comments below (in blue).

Reviewer #1

The authors have addressed all my concerns and the manuscript has been improved considerably. I would like to recommend accepting this manuscript, after the following minor point is addressed.
On page 6, lines 17-18, using EDI, droughts are defined “when the spatially and temporally averaged EDI is less than -1”. However, on page 16, lines 14-15, “In the years 1973 and 1996”, extreme years in EDI, EDI is just above the threshold (value 1.03)”. I am a bit confused by the word “above”, and I guess the EDI value should be negative, right?
Thank you for spotting this mistake. Since we are looking at negative EDI values, it should read „below“ and „value -1.03“.
In addition, on page 17, line 1, “an additional extreme year in EDI just below the treshold” (here, a typo, “treshold” should be “threshold”), here you use the word “below”. I guess there might be some typos?
Corrected.

Reviewer #2

The authors have addressed most of my concerns. In the revised manuscript, the authors showed the sensitivity tests about their results, and I agree with them since that the test of statistical significance is important to the usage of climate network approach. Generally, this work demonstrates that climate network is able to be an effective tool in distinguishing some of drought and heatwave events, and it could be a useful reference for the future work about heatwaves and climate network. I would be oriented to suggest accepting the paper as it is for publication on NPG.
However, I have some considerations that authors and editors may take into account if they agree and think are useful to improve the manuscript:
(1) In the previous version of the manuscript, the authors showed the node degree probability distributions for extreme years and normal years (in the Fig. 4 of the previous version): During average years, the distribution of the node degrees is close to the Poisson distribution, characteristic of random networks, while for extreme years the distribution is more uniform and heavy tailed. It is a fact for the existence of such phenomenon observed from the authors’ results. This is interesting and impressive.
However, in the revised manuscript, this figure was omitted, since the authors said they could not substantiate or explain the underlying mechanisms. I would suggest showing this figure in the revised manuscript, or in the supplementary materials. The authors may only give brief introductions for the figure. Though this phenomenon has not been thoroughly explained at the current stage, at least its existence should be informed to the readers. This could be useful for the future work which refers this manuscript.

We have (re-)included a brief paragraph on this observation. It is certainly worthwhile to investigate this further in the context of random geometric graphs (which can be quite similar to random graphs with Poisson distributions under certain conditions).

(2) A recent work addressed the heatwave patterns and propagations using climate network (see below), and it may be mentioned in the manuscript. This could be useful for better informing the readers.
Mondal S, Mishra AK. Complex networks reveal heatwave patterns and propagations over the USA. Geophysical Research Letters, 48 (2021).
We mention the paper in the introduction.
(3) I would suggest the authors to revise the captions of Tabs. 3 and 4, and Figs. 2, 5, 6, 7, 8 and 9. The information in the captions was omitted too much, such that it was not convenient for readers.
We hope the captions are clearer now.