

Reviewer 1

Overall, this manuscript examined the heatwaves of eastern European using long-term observation datasets. One important finding of the manuscript is to identify the importance of long-term observation data to reveal the "real" trend of heatwaves. Another important finding of the study is to reveal the correlation of heatwave and AMO. Overall, i find this paper well-written, and reads smoothly and I really enjoy reading it. Besides a few minor typos, I suggest acceptance of this manuscript. Detailed comments are listed below.

We thank the reviewer for the constructive evaluation of our study. In the revised version of the manuscript, we will consider all comments and suggestions and we will improve the manuscript accordingly (see detailed responses below).

1. In the title of the paper it mentioned "the role of natural variability vs anthropogenic factors". However, after reading the entire manuscript, i don't seem to agree with the title, as there is little about quantification of the contribution of natural and anthropogenic factors to heatwaves, such as that in Luo et al. (2023). Therefore, i would recommend either delete it, or use something else.

We agree with this point and will revise the manuscript accordingly. Specifically, we will add an analysis which deals with the attribution of the summer 2023 extreme temperature, which will add more weight to the "natural vs anthropogenic factors" discussion.

2. Line 112. should be "Which is an indicator"

3. Line 207, "which can be influenced"

4. Line 243, "indicates how difficult", i would suggest using "misleading" instead of "difficult" here

5. You may consider adding few more references here.

Lau N-C, Nath MJ (2012) A model study of heat waves over NorthAmerica: meteorological aspects and projections for the twenty-first century. J Clim 25:4761–4784. <https://doi.org/10.1175/JCLI-D-11-00575.1>

Yang, Z., Dominguez, F., & Zeng, X. (2019). Large and local-scale features associated with heat waves in the United States in reanalysis products and the NARCCAP model ensemble. Clim Dyn, (3), 1883–1901. <https://doi.org/10.1007/s00382-018-4414-x>

Chan, P.W., Catto, J.L. & Collins, M. Heatwave–blocking relation change likely dominates over decrease in blocking frequency under global warming. npj Clim Atmos Sci, 5, 68 (2022). <https://doi.org/10.1038/s41612-022-00290-2>

6. Line 386 and Line 365 are the same. Please delete one of them.

All the aforementioned corrections/suggestion will be implemented in the revised version of the manuscript.