

Review II of "*Quantifying atmospheric and land drivers of hot temperature extremes through explainable Artificial Intelligence*"

I thank the authors for their detailed responses. Based on their rebuttal, several of my comments have been (or will be) addressed satisfactorily. I would like to expand on 2 points below:

CO2 SHAP heterogeneity (follow-up)

I am not convinced the response fully addresses my concern. I suspect the CO2 feature does not isolate the direct effect of CO2 on local temperature, but instead absorbs the trended component of additional drivers, including changes in circulation (forced or internal) and possibly in land–atmosphere feedbacks. Read this way, the cross-location differences are unsurprising and consistent with work from Sippel et al. (2020) and others.

My concern is the interpretation. The manuscript treats the CO2 importance as a direct anthropogenic contribution (e.g. the abstract's "contribution of the anthropogenic factor through CO2 concentrations"; the conclusions' "the model captures the long-term forcing signal"). I would ask that this be read more cautiously: the feature captures an aggregate trended signal, its cross-location spread reflects regional differences in those multi-decadal trends, and part of it may be internal variability rather than forced. As such, attributing it specifically to anthropogenic forcing warrants care.

A simple check would help settle this: replacing the CO2 input with a plain year (or normalized time) index and retraining should leave the per-location importances and the Land/Atmosphere/CO2 split essentially unchanged, showing the feature acts as a generic trend regressor rather than carrying information specific to CO2.

Physical-understanding claim (follow-up)

I thank the authors for agreeing to temper these statements and find the proposed replacement appropriate. I ask only that the claim that the results "enhance our understanding of the physical mechanisms behind temperature extremes" be removed everywhere it appears, including the abstract (and its duplicated instances in the body) as well as the introduction.

Additional points noticed when skimming manuscript again

- §2.2 (soil moisture): The sentence "As for soil moisture, both SPI and SPEI grid-points are averaged spatially over a 100km x 100km region" reads as though spatial averaging had been mentioned before, but I don't believe that is the case
- L122: "(see 3)", the section reference appears to be broken, should probably read "see Sect. 3"?