

Paper: wcd-2025-892, entitled “Mean state and day-to-day variability of tropospheric circulation in planetary-scale barotropic Rossby waves during Eurasian heat extremes in CMIP5 models”,

By Iana Strigunova, Frank Lunkeit, Nedjeljka Žagar, Damjan Jelić

Response to the comments by Referee RC2

Dear Referee,

Thank you very much for your positive evaluation of our manuscript and your constructive comments and suggestions. Below please find our responses, presented in blue font following your comments in black font.

In addition, we have enclosed the revised manuscript, which largely incorporates the reviewers' comments, as point-to-point responses. Please note that we have added an assessment of the statistical significance of the composites shown in Figures 3 and 4 (as well as Fig. S3 and S5) in this version.

Your sincerely,

Iana Strigunova, Frank Lunkeit, Nedjeljka Žagar, Damjan Jelić

Minor comments:

Lines 8-9: Better to rephrase to clarify that it is the model representation that is uncertain: “There is considerable uncertainty in how climate models represent the associated Rossby wave circulation...”

Response: We rephrased as suggested.

Line 9: “This further limits confidence in future projections...”: Unclear whether “this” refers to circulation uncertainty, day-to-day variability, or model disagreement. **We rephrased it as “There is considerable uncertainty in how climate models represent the associated Rossby wave circulation”.**

Lines 50-51: Consider integrating the citation directly into the sentence for smoother flow: “...wet-bulb temperature, as used by Buzan et al. (2015) to compute the US Weather Service Heat Index.”

The citation is integrated as suggested.

Line 123: “35a period” should be “35-year period”

[Corrected as suggested.](#)

Line 125: “We use the entire periods (40 and 35 years, resp.) to consider the largest possible datasets, given the rarity of EHWs.“: could be simplified to “We use the full periods to maximize the sample size, due to the rarity of EHWs.”

[Corrected as suggested.](#)

Section titles are inconsistently capitalized. For example, “2 Data and Methods” uses title case, while others like “3 The statistics of Eurasian surface heat waves” do not.

[We corrected it, so now only the first word is capitalised.](#)

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Response to the comments by Roberto Rondanelli

Dear Roberto Rondanelli,

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Minor comments:

line 21: causing biases in atmospheric teleconnections

We prefer “atmospheric bias teleconnections” as this terminology follows the reference Zhao et al. (2024) and denotes remote effects of local biases rather than a “bias in atmospheric teleconnections”.

line 22: and other anthropogenic

line 39: and in a regional

Corrected as suggested.

I am not entirely happy with the readability of Figure 1 in particular with the way in which the orange bars can be seen in the HIST/RCP4.5 comparison. I ask the authors to decide if it's better to move the RCP4.5 bars to a single row.

The new figure with orange bars as a single row is in the revised version.

line 224 over western North America

Corrected as suggested.

Also I apologize that this suggestion should have come earlier in the process, but I think Figures 2 to 4 would benefit from slightly thinner coastal boundaries and auxiliary latitude lines, and also perhaps slightly thinner vectors, so anomalies are better observed.

[New figures with incorporated suggestions are in the revised version.](#)

Finally, I wish authors would develop an explanation (even if it's speculative) on why AMIP simulations perform better than HIST ones in the summary and conclusions.

We added the following sentences in the conclusions:

"This is consistent with the outperformance of AMIP compared to HIST simulations found in our study. These results seem to indicate that the background state is more important for the EHWs than the interaction with the ocean, at least in the limit of the differences between the mean states simulated in AMIP and HIST. A thorough assessment of the role and the importance of the atmosphere-ocean coupling can thus only be achieved with comparably good climatologies in coupled and uncoupled simulations."