Paper: wcd-2022-23, entitled "Signatures of midlatitude heat waves in global Rossby wave spectra",

By Iana Strigunova, Richard Blender, Frank Lunkeit, and Nedjeljka Žagar

Dear Dr. Rivière,

Thank you very much for your additional thorough and constructive comments on the manuscript.

We have reviewed the manuscript accordingly, including a few more minor changes.

Enclosed please find our responses, presented in blue font following your comments in black font. We are looking forward to hearing from you again.

Your sincerely,

Iana Strigunova, Richard Blender, Frank Lunkeit, and Nedjeljka Žagar

Comments & Responses:

Comment:
1) Line 197: The time series of I'_nu is said to define the climatology. This is misleading for the reader since the climatology of the energy is in bracket in Eq(6). I would say I'_nu is the time series of the anomalous daily energies.

Response: We clarified that in the further analysis, the time series of the anomalous daily energies, I'_nu, is considered to be the climatological state (climatology) as a reference state for the comparison with the time series of the anomalous energies during heat waves. The latter is formed combining only time steps of the observed HWs according to Table 1.

Comment:
2) Line 216: I do not understand the if in parenthesis

Response: We removed "(if)"

Comment:
3) Lines 228-234: There is no introductory sentences to Fig. 5 and its objectives. The paragraph starts discussing robustness of the results and not the results themselves. This is not confortable for the reader.

Response: We added an introductory sentence to Fig. 5 and clarify that Fig. 5 is used here for discussing the climatology and, in the following section, the HWs.

Comment:
4) Section 3.2.1: There is an issue on the order of the figures and their description. I do not understand why Fig.6 appears after Fig.5 since the main results of Fig.5 are described after those of Fig.6.

Response: With reference to the previous comment, we now clarify that Fig. 5 is first used for the discussion of the climatology (in section 3.2.1), and the changes of the PDDFs due to HWs are discussed in the following section together with PDFs of HWs (Fig. 6).

Comment:
5) Line 312: "is also consistent"

Response: Corrected.

Comment:
6) Fig. 8b. Please indicate we are looking at variance anomalies of HWs with respect to climatology.

Response: We modified the caption of Fig. 8 accordingly.

Comment:
7) Lines 363-367. The sentences miss some precision. Suggestion: "The increase in skewness FOR PLANETARY WAVES REVEALS the decrease in the number of active degrees of freedom during HWs. This aligns with the results of Lucarini and Gritsun (2020) which are based on the atmospheric stability during Atlantic blockings. Based on the χ 2 -skewness, we estimate a reduction of the active degrees of freedom FOR PLANETARY WAVES during Eurasian HWs of about 25% compared to climatology.

Response: Modified as suggested.

Comment:
8) Line 374: I do not understand the beginning of the sentence: "During HWs, planetary Rossby waves are less active (especially k = 3), and a persistent anomaly... ". Even though the intraseasonal variance of planetary wave k=3 decreases, this wavenumber emerges during HWs and is persistent. So I think saying "planetary Rossby waves are less active" is really confusing.

Response: We modified the text as follows: "During HWs, the planetary-scale Rossby waves (primarily k=3) exhibit reduced intramonthly variability. The involved modes are less independent from one another, and a persistent large-scale anomaly is formed, typically referred to as blocking. "