

Response to Reviewers:

On the role of moist and dry processes for atmospheric blocking biases in the Euro-Atlantic region in CMIP6

We sincerely appreciate the reviewers for taking the time to evaluate our revised manuscript. We are pleased to receive your positive feedback. In the following, we have addressed your recommendations in the updated manuscript. The text below (highlighted in blue) details the specific amendments made in response to your suggestions. Figure and line numbers refer to the revised version of the manuscript.

Reviewer 1

The authors have put a lot of effort into the revisions and have thoroughly addressed my concerns. The results are very interesting, and I consider them to be an important contribution to WCD. I recommend that this paper is accepted for publication.

I only have a few minor comments regarding typos and wording:

1. Line 60: I find the phrasing in the first sentence confusing, particularly the use of the word “however”. The word somehow suggests that the findings based on anomaly block indices are not as reliable as those based on absolute indices, but I assume this is not what you mean?

You are right; the sentence may be misleading. We have rephrased the line 60 as follows:
“Other studies suggest that blocking biases stem from systematic biases of the tropopause height. A too high tropopause reduces blocking frequencies at higher latitudes, especially when blocks are being diagnosed with anomaly block indices (Attinger et al., 2019).”

2. Line 381: this study – > our study (otherwise it is not clear whether you mean your study or the one by Joos et al. 2023)

We have replaced “this study” with “our study”

3. Line 381: at a later times – > at a later time

We have replaced “at a later times” with “at a later time”

4. Line 382: appear to an underestimation – > appear to be an underestimation

We have replaced “appear to an underestimation” with “appear to be an underestimation”

5. Paragraph starting on line 389, (i), (ii) and (iii): bias – > “a bias” (or “biases”)

We have replaced “bias” with “biases”

Reviewer 2

Technical corrections:

- L1: features – > features of the atmospheric flow

We have replaced “features” with “features of the atmospheric flow”.

- L35: at the upper-level anticyclone – > in the upper-level anticyclone

We have replaced “at the upper-level anticyclone” with “in the upper-level anticyclone”

- L62: types of indices – > types of blocking indices

We have replaced “types of indices” with “types of blocking indices”

- L97: four questions – > three questions

We have replaced “four questions” with “three questions”

- L210: lower – > smaller

We have replaced “Lower” with “Smaller”

- Figure 3: two b) labels

Thank you for pointing this out. We have adapted the figure.

- L324: background flow, dry and moist diabatic – > background flow and dry and moist diabatic

We have replaced “background flow, dry and moist diabatic” with “background flow and dry and moist diabatic”

- L365: heat eddy – > eddy heat

We have replaced “heat eddy” with “eddy heat”

- Figure 5: panel labels incorrect

We apologise for the labeling errors. We have corrected the labels.

- L374: west coast – > east coast

We have replaced “west coast” with “east coast”

References

Attinger, R., Keller, J., Köhler, M., Riboldi, J., and Grams, C. (2019). Representation of atmospheric blocking in the new global non-hydrostatic weather prediction model icon. *Meteorologische Zeitschrift*, 28(5):429–446.