

## Technical corrections

Dear Laurie Menviel,

In response to the reviewers' comments and queries, we have addressed each point comprehensively. Below, you will find our responses, presented in regular font, alongside the reviewers' comments, denoted in *italics*.

*1-Could you provide some possible reasons as to why the transition from macro weather to climate is shorter at high than low latitudes?:*

- We discuss this problem in lines 311-318, but we limit our discussion in this manuscript to naming and describing the phenomenon. We don't want to guess as to the reasons behind it.

*2-Please consider adding in the Introduction and Discussion a few sentences on the physical processes and drivers that underpin your study of the climate regime change:*

- In terms of climate variability at different timescales, these processes are already mentioned in the introduction in lines 88-105. We have some general information on the proxies we use in lines 106-119, also in the introduction. Since we consider timeseries from different archives and sites, a description of physical processes in each case would take too much space. In the discussion, various processes and drivers are mentioned in lines 319-338.

*L. 62-63: "averaging more and more seems to converge", can you please rephrase by being more explicit?*

- We rephrased this to "by increasing the timescale the average converges more and more".

*L. 76-77: I do not follow the logic here as to why all climate variability has to be linked to Milankovitch.*

- In our text we indicate exactly this point, that the timescales involved for  $\tau_c$  are too short to be related to Milankovitch and that some other currently unknown forcing mechanism has to be at play.

*L. 81: "thought" iof "though"*

- Corrected.

*L. 93-95: Please rephrase that sentence as its odd structure does not make it correct*

- We broke the sentence in two to make it clearer.

*L. 100-103: I do not understand why the transition between macro weather and climate can only be studied in empirical records and not modelling studies.*

- In the text we mentioned that because the models cannot replicate the large low-frequency variability of the climate, the transition can only RELIABLY be investigated in empirical records. Of course, the same can be done in climate simulations, but taking in mind the relative weakness of climate models at these time scales.

*L. 123: please rephrase “understanding of the whole”*

- Rephrased to “spatiotemporal analysis”.

*L. 197-198: Should this sentence be moved to the Methods?*

- We moved this sentence to the description of Figure 9, since we think it fits better in the results section than in the more general methods section.

*L. 210 and other instances, please use the present tense in the Results section*

- Corrected.