

## **Second review of “The relationship between extra-tropical cyclone intensity and precipitation in idealised current and future climates” by Sinclair and Catto re-submitted to Weather and Climate Dynamics**

### **General comments**

I thank you for considering and carefully replying to all the reviewers' comments. I think the (very interesting!) additional analysis of the changes in the mean atmospheric state now greatly “round off” the manuscript and make many results regarding the linear relationship between vorticity and precipitation better understandable/interpretable. Therefore, I suggest to accept the revised manuscript after considering the following few very minor comments that all refer to how things are phrased (the line numbers below refer to the line numbers in your tracked-changes document). Note that particularly in the new text passages there are still quite a few typos, of which some I mention below.

### **Minor comments**

L5-8: I think it's great that you now discuss this aspect (i.e. similar vs. changing slope, and the potential role of changes in the background state) so clearly throughout the manuscript, but I wonder whether this “hypothesis” sentence is really at the right location here in the abstract? Could you mention this hypothesis later, after the finding that the slopes slightly change and what this might mean (see next comment)? I'm not sure what is better, but in the current form I find the sentence a bit isolated, because later you don't really refer back to this hypothesis...

L13-14: This sounds very technical now for an abstract (“slope of the linear regression line is statistically larger”), and, moreover, not unambiguous, as it's not clear which slope you actually refer to. Why not writing something like: “The amount of precipitation for ETCs with a specific vorticity is higher in the uniform warming and polar amplification simulations than in the control simulation (i.e., the slope of the linear regression between vorticity and precipitation is larger), indicating that changes...”. Furthermore, could you add the explanation for this conclusion, i.e. the hypothesis mentioned earlier, right here instead (see previous comment), and then mention the potentially additional processes that might compete with diabatic heating (i.e., reduction in baroclinicity, which you currently don't mention at all in the abstract)? I think this would make it easier to follow the line of argumentation what a change in slope could mean. I hope you understand my suggestion...

L19: You both use “dependence” and “dependency” in the abstract, so I would consistently use only one.

L21: Typo “voricity”

L26: Comma before “whereas”

Figure 2 captions: Maybe write “difference between SST4 and control” (i.e., not just in brackets)

L256: Change to “and causes a decrease in the Eady...”

L258-259: Maybe change to “rather than a decrease in the meridional temperature gradient, which barely changes”

L259-261: I think you should help the reader to see where (and if) the lifting of the tropopause can be seen in these figures. I assume you could kind of see it in the changes in the Brunt Väisälä frequency, right? But how exactly? Is the tropopause basically going up by the vertical extent of the negative Brunt Väisälä frequency anomaly? At least, this lift is not obvious to me at first glance...

L261: "the jet to move equatorwards"

L264: "related to a decrease"

L321: "largest slopes and correlation coefficients occur"; furthermore, I guess you refer to Figure 4 when you write "The same as Figure 3, but...?"

L345 and L347: Change back to "feedback" as it's a noun there

L346-349: It's nice that you now include this sentence here, but it is a bit "heavy" to read and not very specific. In fact I liked the wording you used in your response document more, when you said something like "the increasing slope might still indicate an increased diabatic feedback on vorticity, which, however, might be masked by the counteracting reduction in Eady growth rate" -> I think the use of "mask" or something similar might be helpful here...

Figures 5 and 6: Did you leave the range rings here on purpose, although you removed them in Fig. 4? I think you could just remove them everywhere.

L495: "in the number of weak ETCs"

L509: "compared to cold front ETCs"

L542: Something is off with "... as with uniform uniform these ETCs are less..."

L555: "means that precipitation"

L557-558: "do not act to intensify warm front ETCs"

L560-562: I don't understand this sentence here, particularly the second part of the sentence "..., the weak ETCs in this cluster see..."

Conclusion: Make sure you stay with one tense, because you start with past tense but then, at least partly, fall into present tense (for instance at L577).

L578: "uniform warming"

L595: "feedback" instead of "feed back" as it's a noun here, right?