

Review of the manuscript entitled "Further examination of the thermodynamics modification of the inflow layer of tropical cyclones by vertical wind shear", by M. Riemer, M. T. Montgomery and M. E. Nicholls, submitted to ACP.

**Recommendation: Accept with minor revision.**

### **General comment**

This paper extends the numerical modelling study of the effects of vertical wind shear on the dynamics and thermodynamics of tropical cyclones by the same authors (Riemer et al., 2010). The idea of analyzing additional numerical experiments to establish the robustness of the earlier findings (for example when ice microphysical processes are represented) is a natural and important extension of the earlier study. The results of the new experiments are interesting and broadly support the conclusions of the earlier ones. The paper is generally well written and certainly worthy of publication, but it might be improved further by small changes in wording here and there as detailed below. I found a few sentences/statements to be unclear and I would recommend that these be reformulated. Again, these are detailed below. I have highlighted the page and line in bold.

### **Minor comments**

P6990, L9: I suggest: "We survey here ... "

**P6990, L16:** What, precisely is meant by "a higher downdraft activity". How is such activity quantified?

P6991, L16: I suggest inserting a comma after "Carnot cycle". Should Carnot cycle be hyphenated?

P6991, L21: Is it really necessary to introduce the non-standard acronym "SBC"? My suggestion would be to get rid of it!

P6992, Footnote 2: "has been" should be "was".

P6993, L8: I suggest: "We survey here ... "

P6993, L16: I suggest placing "employed" after "scheme".

**P6993, L24-25:** I would have thought one could give a pretty good explanation for how these differences arise in terms of the conventional (balance) model of spin up, noting that the inclusion of ice microphysics will substantially modify the diabatic heating rate etc. etc.

P6994, L19-21: I don't fully understand the arguments here. Doesn't the "replenishment time" for  $q_e$  depend on the total wind speed and not just the strength of the inflow? How do you quantify "more complete"?

P6996, L16: I suggest replacing "the scheme" by "that".

P6996, L19: I suggest replacing “wind” by “flow”. Wind usually refers to the horizontal component of the flow.

P6997, L4: I suggest removing “also” and inserting “further” after “grow”.

P6999, L2: I suggest replacing “and” by “together with”.

P6999, L8: What is the significance of the acronym RMN?

P6999, L22: Is “mps” defined in RMN10?

**P6999, Sec. 2.4:** It might be helpful to the reader to say briefly what the purposes of the new experiments are and not just specify them?

P7000, L10: I suggest replacing “consistent” by “common”.

P7000, L15: I suggest inserting a comma before “but” and writing “due also” so as not to split the verb.

P7000, L24: I suggest replacing “of” by “between”.

P7002, L6: I suggest inserting a comma after “gradient”.

P7004, L1: I suggest moving “in contrast” before “In CBLAST”.

**P7004, L13-15:** I find this sentence unclear and the appearance of “based on the” twice in one sentence is clumsy. Why can one expect a more pronounced intensity decrease in ICE<sub>68</sub>?

P7005, L8: I suggest replacing “to” by “from”.

P7005, L28: Insert “a” before “quiescent”.

**P7006, L14-17:** It would be worth saying what the reduced mass flux would do, rather than simply writing “due to”.

P7008, L15: I suggest inserting “The quantity” before DFX.

P7009, L4: Is a “helical updraft” the same as a “rotating updraft”?

P7009, L10: I suggest placing “thus” at the beginning of the sentence.

P7009, L13: I suggest writing “ ... the correlation of the location of formation of the stationary band complex with the tilt ... ”

P7009, L25: I suggest placing “therefore” at the beginning of the sentence.

P7009, L26: I suggest placing “however” at the beginning of the sentence.

P7010, L4-5: Too many “and”s in this sentence.

P7012, L25: I suggest adding a comma after “cycle” and deleting (or moving) “thus”.

P7013, L6: I suggest replacing the first “in” by “into”.

P7013, L7: I suggest adding a comma after “cases”.

P7013, L20: I suggest placing “however” at the beginning of the sentence.

P7013, L22: I suggest placing “therefore” at the beginning of the sentence.

P7014, L4: I suggest adding a comma after “semicircle”.

P7014, L8: I suggest placing “In contrast” at the beginning of the sentence for more emphasis. Also, to what does “it” refer?

P7014, L19: I suggest placing “here” at the beginning of the sentence.

P7014, L25: I suggest placing “therefore” at the beginning of the sentence.

P7014, L27: I suggest adding a comma after “(Fig. 9a,b)”.

P7015, L2: I think you don’t need the comma after “both”.

P7015, L10: I suggest replacing “as” with “to those”.

P7015, L26: Why i.e.? I don’t follow the argument.

P7016, L4-6: I don’t understand this sentence. “respectively” doesn’t fit!

P7016, L29: I would put “also” before “the associated” on the previous line.

P7017, L11: I suggest placing “nevertheless” at the beginning of the sentence.

P7018, L4: I suggest writing “We consider now ... ” and inserting a comma after “short-lived”.

P7018, L23: I suggest inserting a comma after “ICE<sub>68</sub>”.

P7018, L24: I suggest inserting a comma before “but”.

P7018, L27: Would “preferentially” be better than “preferably”.

P7020, L13: I suggest writing “examines further”.

P7020, L14: I suggest replacing “based on” by “on the basis of”.

**P7021, L3-4:** This sentence is unclear. What is “interacting” with the shear?

P7021, L9: The construction “to, e.g.,” is a little clumsy!

P7021, L22: I suggest placing “However” at the beginning of the sentence.

P7022, L12: I suggest replacing “as” by “to those”.

P7022, L14: I suggest replacing “are all the most” by “more”.

P7022, L16: I suggest replacing “than” by “as that”.