

Review of “Objective Identification of high wind features within extratropical cyclones using a probabilistic random forest (RAMEFI). Part 1: Method and illustrative case studies”

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We would like to thank the reviewers and editor again for their review of our manuscript. Below we addressed the remaining comments of Reviewer 1 in blue. Text changes are included in italics when suitable. Line numbers correspond to the revised manuscript

Thank you for carefully taking most of my previous comments into account and revising the manuscript accordingly. The revised manuscript is certainly improved. The reorganisation of the structure and the rephrasing / clearer explanation of the machine learning terminology certainly helped. I have a few minor comments remaining:

- The revisions made to the manuscript in an attempt to address my previous major comment #2 (“Limitations of the method should be clearly highlighted) are quite well hidden in the manuscript and only amount to a few added sentences. I am of the opinion that the limitations should be highlighted in the conclusions section as well.
We added the requirement of hourly resolution again in the conclusions: “Being independent of spatial behaviour or gradients and only requiring 1h tendencies, the approach is very flexible and can be applied to single stations or grid points and various data sets with differing grid spacing. However, due to the fast movement of meteorological features in stormy situations hourly resolution is required, making the algorithm inapplicable to some climate data sets.” (lines 608 – 609)
Furthermore, the following sentence regarding the wind threshold was added: “We note that we set a v threshold of 0.8 to focus on high wind areas. However, we do not expect the RF to be sensitive to small changes in the threshold and, in principle, the RF can be applied to wind speeds below this.” (lines 605 – 607)
A note on usability outside of the training area was already added in the conclusions section in our last revision (lines 626 – 628).
- Section 2.1 / my previous minor comment #8. In the revised manuscript, in lines 97-98 it is stated that “the WCB is the main cause for long-lasting precipitation (Catto, 2016). Furthermore, the WCB can be the cause of strong convection along the cold front”. Then in line 102-103 it is written: “the WJ is usually characterised by positive temperature anomalies, decreasing pressure with time and little or no precipitation.” I cannot see how these two statements are consistent with each other especially considering in lines 93-94 it is stated that the WJ and the WCB are the same thing: “.WJ is associated with a warm air flow, typically ahead of and later ascending above the surface cold front, often referred to as the warm conveyor belt (WCB)” This part of the manuscript needs to be revised.
*Again, we are sorry for the confusion. The last statement is meant as the WJ is associated with the **early stages** of a WCB **before** it ascends and causes the discussed precipitation. It is not associated with the whole development of a WCB.*
We added the following sentence for clarification: “An important feature in extratropical cyclones is the warm conveyor belt (WCB; [...]). It starts near the surface ahead of the surface cold front and later ascends above it. [...]
Here, we focus on the early stages of the WCB while it is still near the surface and can cause high winds there and refer to it as the WJ.” (lines 94 – 100)
- Very minor comment: Appendix C is now referred to before Appendix A and B. Consider changing the order of the Appendices.
This has been changed accordingly.
- Section 3.1 / my previous major comment #1c.1 (how the 12 storms were selected). I still find it a bit unclear. Is it the 12 storms with the largest SSI or is it storms with a non-zero SSI and then a subjective choice to make sure a diverse range of storms is chosen? Please clarify and add a few more details to the manuscript.

It is a combination of both. We included the eight storms with the largest SSI and added 4 more storms with an SSI > 3 based on a subjective choice.

We adjusted the following sentence accordingly: “*This includes the eight most devastating winter storms with the highest SSI during this time period plus four subjectively chosen but also some more moderate storms to capture a healthy diversity of cyclones and features.*” (lines 202 – 204)

- Line 241 “the approach is independent of temporal evolutions beyond 1 h”. This is unclear - I think what is meant is that the approach is independent of temporal resolution greater than 1 h / time difference less than 1 h. Please revise.
What we wanted to say here was that the approach does not need a full time series of several hours but only the evolution since the last hour (--> tendencies).
We changed the sentence to: “*The approach evaluates each 1h interval independently.*” (lines 241 – 242)
- Line 243. “in several selected case studies” If this is the 12 case studies it would be clearer to write 12 rather than “several”
This has been changed accordingly.
- Line 584. “Within the warm sector”. Should this read within the warm jet?
As there is no “Within the warm sector” in line 584, we believe it to be line 501. Indeed, it should read warm jet. This has been changed accordingly.
- Figure 6 and 7. Although CEP is defined in the text, it would help a reader to add this into the captions. Furthermore, the x-label “Forecast value” does not seem consistent with the revised terminology in the manuscript.
We wrote out the abbreviation CEP in the y-label and changed the x-label according to the terminology used in the manuscript.
- Figure 8, 9 and 10. I really feel that the delta symbol problem will need to be fixed now or during the copy-editing stage. At worst, an explanation of this symbol needs to be added to the caption.
The Delta symbol seems to be displayed inaccurately/as some other symbol in some older versions of PDF readers or when printed. However, we could not reproduce this problem using various PDF readers ourselves, and we hope it is an isolated incident, such that we did not add an explanation to the caption.