

“A climatological characterization of North Atlantic winter jet streaks and their extremes”

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Recommendation: Minor Revisions

Overview:

This study uses the ERA5 reanalysis to perform a climatological investigation of North Atlantic jet streaks during the winter months and compares their characteristics against a group of “extreme jet streaks”. This study is particularly topical, since extreme jet streaks can have an influence on the aviation sector and lead to the development of high-impact weather events.

Overall, the authors have done a thorough job to address my earlier comments on their manuscript. I am convinced that their results are robust and their additional discussion on the sensitivity of their results to methodological choices has strengthened the manuscript. My only remaining comments are textual in nature. I do recommend the authors take a close look at all figures and their discussion of quantitative values in the manuscript text, as there are several instances in which the values identified do not match the format of the figures and/or the values listed in figures/tables. The removal of any areas of inconsistency will help avoid any potential confusion by a reader. Given my comments are largely minor in nature, I’ve recommended the manuscript undergo a round of Minor Revisions prior to publication. I commend the authors on a very nicely done and enjoyable study to review!

Minor, Specific, and Typographical Comments:

Introduction

Section wide: The revised introduction is very well done and provides a nice comprehensive overview of the study’s topical area.

Methods and Data:

L128–130: This is a very minor comment, but I believe lambda is often used for longitude and phi for latitude in many studies/textbooks. Consider switching conventions here to potentially avoid confusion.

L137–141: I might have missed it earlier, so apologies if I did, but this might be a good place to list the horizontal range of latitudes and longitudes that bound the North Atlantic domain considered in this study.

Results:

Manuscript wide: There are a few instances in which the counts of events are labeled inconsistently. For example, much of the manuscript refers to 1050 jet streak events but the caption for Fig. A1 mentions 1065 jet streaks. I recommend closely reviewing the manuscript prior to acceptance to make sure the sizes of subsets are consistently identified to avoid potential confusion. A similar recommendation also applies to figure captions both in the manuscript and appendices.

L342: If the value of this correlation is known, it might be worth including it as part of this sentence.

L418: It doesn't seem as if there are any red contours in Fig. 12. Consider a revision to this part of the text, accordingly.

L533: The parenthetical reference refers to four rows, but it appears there are only two rows within Fig. 16. Consider a revision accordingly.

Conclusions and Outlook:

L626: Consider swapping the order of the discussion here, since the first cluster in the figures corresponds to anticyclonic wavebreaking and the second cluster corresponds to the zonally oriented jet.

L639: Should "southwest" be "southeast" here when describing the position of the surface anticyclone relative to the jet streak?

Appendices:

L718: It appears based off Fig. D1, that jet streaks that emerge directly after one that precedes it are shorter in length compared to those with a longer time between jet streaks. Consider a revision to the text accordingly.

Figures and Tables:

Fig. 1: I might have missed it, but I think a label for the dashed black contours in panels (b) and (c) might be missing from the caption. I'm assuming these contours are just illustrative isentropes.

Fig. 14: The percentages listed in the caption for the time of genesis do not seem to match with those listed in the figure.

Fig. 18: The caption mentions the WCB outflow frequency is shown at 500 hPa, but the text references 400 hPa. Consider a revision accordingly for consistency.

Table 1: Should significance based on the bootstrap resamples be highlighted in the table? If not, I'm unclear how the bootstrapping approach relates to the definitions of the percentiles and standard deviation.

Table 2: The example numbers provided in the caption do not match those listed in the table for Cluster 1. Also consider mentioning what the red text in the table corresponds to.

Fig. B1: Does the shading correspond to just the spatial PDF for extreme jet streak and are the contours associated with all jet streaks in the category? If so, consider adding more detail to the caption, accordingly. If not, why is the shading so much farther north than the composite wind speeds for the S-regime?

Fig. B2: The labeling of panels in this figure appears to be inconsistent with that in the text.

Fig. C1: It doesn't appear there are any black contours, as mentioned in the caption, but there are red contours.

Figs. G*: Looks like the 2 PVU contour is black rather than red, as indicated in the caption. The top left panel for G1 features different conventions compared to all other plots. It might be worth including a note for cluster 3 as to why no values are plotted for that cluster so that a reader isn't left wondering why.