

Reply document for egusphere-2025-3605

A new look at the jet-storm track relationship in the North Pacific and North Atlantic

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We thank reviewer 1 for the positive feedback following our revision and for the additional minor comments. This document presents the reviewers' comments in blue and our responses and changes in black. The line numbers correspond to the lines in the marked-up manuscript version showing the changes.

Reviewer 1

Overall, I am very pleased with the efforts the authors have made to address my comments and those of the other reviewer. The manuscript, in its current form, is very well written, supported robustly by analyses, and very insightful. The authors are commended for producing a fantastic and thought-provoking study. I only have a few minor comments for the authors to consider prior to publication.

1. Introduction

L53: Consider adding a sentence that briefly summarizes these two seeding branches.

We added a sentence describing the two branches (L53-54).

2. Methods

L149: If there is a pertinent figure from these studies that helps to visualize this distribution, consider referencing that here, as well.

We added the reference to a specific figure from one of the studies (L150).

3. The fundamental jet-storm track relationship on two timescales

L189–193: This result certainly appears to be qualitatively true, but it's not as obvious of a comparison as the aforementioned correlations that are discussed on L169. Could some quick statistics be calculated for the magnitude of the inter-quartile range (IQR) to further support this claim? Similar calculations could also be made when discussing IQRs in L221.

The first part of the comment addresses the statement that the NA jet exhibits strong variability on sub-monthly timescales during extended winter, such that averaging over 30-day windows effectively averages over a wide range of jet velocities. This should be interpreted as a relative statement: the range of jet strengths sampled within individual months is comparable to the total range of jet strengths observed over the entire extended winter. To demonstrate this, we compute the IQR of jet velocities separately for each extended winter month of each year. We then take the median of these IQRs (to quantify a representative IQR of jet velocities within an individual month) and compare it to the IQR of jet velocities in the full extended winters over the entire 43-year

period. For the NA, this ratio is 0.76, indicating that a typical month captures a large part of the overall jet strength variability in extended winter, compared to 0.61 in the NP. These statistics are in line with the statement, qualitatively drawn from Fig. 3, and further quantified in Fig. 6, that the extended winter jet variability in the NA is more strongly dominated by the sub-monthly variability than in the NP.

In L221 (in the previous version of the manuscript) we state that although the IQR of the bins seems (at least visually) to be reduced with the new binning method, compared to the temporal bins, the IQRs remain large. However, a calculation of the median bin IQR for the two methods does not show a significant difference. This is not entirely surprising, as for the temporal binning method, even though we do not capture the direct relation between U and EKE as well, the temporal correlation of EKE reduces the variability within bins.

We therefore removed the part of the sentence that compares the IQR, only keeping the statement that the IQR remains large with the new method (L225-226). We thank the reviewer for helping us find this imprecision.

L287: I am not convinced that the black dot at $U=90$ m/s is exclusively from DJF since there is a pink regression line that also extends to similar values for the NP. Could the authors clarify or make a further revision to the text?

We thank the reviewer for this comment. We modified the text to include March in the contributing months for the black dot $U=90$ m/s.

Fig. 6: The y-axis for this figure is a bit confusing since it may inadvertently imply that the plot shows the variance divided by the covariance. Consider an alternative way of expressing this label to eliminate potential confusion

We modified the y-axis to 'normalised var and cov' to make it less confusing for the reader.

L299: It is a bit unconventional that these traits are listed out of order compared to how they are shown in Fig. 6. Consider an edit to the text that lists the variables in the same order as they are shown in Fig. 6.

We modified the order to correspond to the panels from Fig. 6.

L351: Consider referencing Fig. 2 to help remind the reader where to verify this prior result.

The content of this sentence corresponds to the results from Fig. 5. We added a reference to help remind the reader where to verify this result, as suggested.

5. Implications of different jet states in DJF for eddy and cyclone characteristics

L436: Consider breaking this paragraph into two separate paragraphs, with the second paragraph beginning with the discussion of the eddy orientation.

We have broken the paragraph into two as suggested in the revised version of the manuscript.

6. Summary and conclusions

L531–532: The last half of this sentence seems a bit out of place (i.e., the part that begins with “can be even better understood...”). Consider a revision that further clarifies the discussion. Perhaps a solution could be to swap “as well as” with “or”?

Thank you for pointing out this confusing sentence. We simplified the wording in the revised document (L534-535).

Section wide: A lot of references are made to results from prior figures as part of this synthesizing discussion. Consider referencing the pertinent figures that support various claims with parenthetical references to help orient a reader who may start by reading the conclusion section as an “executive summary” of the work.

We added references to the pertinent figures throughout this section.