Review of Degenhardt et al Understanding Winter Windstorm Predictability – revised submission

In general the paper is much clearer than the initial submission. I still found the last part (section 4.3, and corresponding figures 4 and A6) a bit hard to follow. Otherwise, I would be happy for the paper to be published after addressing the following comments.

L130 Do you really mean that these processes in the cyclone creates the jet stream? Isn't the jet stream a larger-scale phenomenon? Do you mean this strengthens the jet stream?

> [LD] This is more an explanation of the general process in the atmosphere. This should not say, that the cyclones are creating the jet stream. We change the wording accordingly to avoid any misunderstanding.

L130 what do you mean by "ocean colour"?

> [LD] This was misleading. We wanted to point out, that the SST is represented as the colour of the sea areas.

L188 I didn't understand where you were talking about here, in terms of the differences in precip – do you mean upstream rather than downstream? And if you do mean downstream would these differences really have an impact on storm forecast skill? Wouldn't the precipitation differences here be a result, rather than a cause, of the imperfect storm forecasts?

> [LD] We meant downstream, sorry for the mix-up.

Fig 2: it's hard to see the coloured lines in some of the distribution panels – not sure how you could make them clearer, maybe increase the line width? The blues are a bit easier to see than the reds. Does the colour of the ERA5 line change according to the value (not sure if it does or if it just looks different depending on context)? If so maybe don't do this, and choose a single colour for the ERA5 value that is easiest to see.

> [LD] yes, the line was the same colour as the ERA5 correlation value. We tried a different colour and hope this provides better visible throughout the figure now.

L206: I don't understand this sentence. From the histogram, it looks like the ERA5 correlation is within the range of the GloSea5 correlation distribution – what is the evidence for these being statistically different?

> [LD] The histogram in the back only shows a little bar for that category. You need to be careful, as the histogram counts in ranges to create the bars, as the ERA5 value is an exact value. It is the case that the value from GloSea5 within that bar is left of the ERA5 value, hence the ERA5 value is outside the GloSea5-distribution. We tried to add more explanations to make this clearer without prolonging the sentence too much.

L220: do you mean downstream not upstream?

> [LD] Yes, sorry, we changed accordingly.

L226: although the skill does not seem to be present actually at the equator, only from about 5N.

[LD] True, according to Scaife et al. (2017), their Fig. 2, the Atlantic skill is highest at the 5° northern border of their selected box, so very much in agreement.

Figure 4: I found this figure a bit confusing – I think the caption could be clearer about what exactly is shown here. Reading the text (paragraph beginning on L256) helped me to understand a bit more what the plots are showing but I think you need to be clearer in the caption.

[LD] With restructuring the caption and adding more information, we hope this is now clearer from the caption itself.

L264: It's not clear to me how you define this. Isn't the SST factor based on the tripole structure of the SSTs? So how do you define the SST skill over the whole N Atlantic?

[LD] In the factor-skill-view we take the whole North Atlantic, as the forecast skill of SST is significant over most of the North Atlantic. For the Process-based-view you are right, and we are only taking the tripole structure.

L359: Can you elaborate on how this relates to the signal-to-noise paradox? In particular:

Is the s-to-n paradox seen in GloSea5 for windstorms? (has this been shown?)

How do your results relate to the s-to-n paradox – i.e. how could your results help to explain this, or help to reduce the s-to-n issue?

[LD] We added a more explanatory sentence about the s-to-n paradox. And yes, the stn-paradox is also found in windstorms, as we showed in Degenhardt et al. (2022).

General point: "bad predicted" is incorrect: it should be either "badly predicted" or "poorly predicted"

[LD] Many thanks, yes, we changed accordingly throughout the manuscript

wcd-2013-12 second review: Understanding Winter Windstorm Predictability over Europe

I appreciate the effort the authors have made following the first round of reviews. Improvements have definitely been made in terms of clarity and readability. The results are now better summarised, particularly in the discussion section. I do however still think that more needs to be done in places to improve the written English in terms of both grammar and clarity. I believe that if these comments can be addressed the manuscript will be suitable for publication in WCD, as the results are interesting and add to the growing body of work on seasonal forecast skill.

Please find below my comments.

Major comments:

1. There are still many occasions where sentences are improperly structured and/or lack clarity. Given that at least one of the coauthors is a native English speaker, I am surprised that this is the case given the comments from both reviewers in the first round of reviews. I think that for this paper to be published it still requires a thorough proof read and edit for clarity and readability. I have suggested some changes in the comments below to some of the most obvious places where the writing can be improved, but I encourage the authors to check for others.

> [LD] The native speaker of the author team went through the whole manuscript again and proof-read the manuscript in great detail.

2. Have you compared how the windstorm forecast changes if you used random regional boxes (I.e. not related to forecast skill or factor relevance)? It would make your results stronger if the increases you find are very different than for random regions.

> [LD] Many thanks for this comment. Yes, we did test with different boxes, but all dependend on forecast skill or the physical connection postulated. Each of the results does show slightly different increase in windstorm forecast skill but here we present the combination of boxes with the strongest difference to identify the most important and significant links.

> Unfortunately, further random testing cannot be performed right now in full detail, as this is work from a PhD Thesis which is already completed and there is no current access to the data and script. If this is would be a requirement before publication, we would unfortunately, need more time to regain access to University computer systems to test this idea. Nevertheless, we are confident that the way we addressed this problem is well-suited to provide robust and comprehensive results to this problem.

Minor comments:

L24: "studies use various…". Is this sentence needed here?

> [LD] This sentence introduced the idea of tracking storms instead of using a general state or pattern of the atmosphere. But we can see that this was unnecessary, so we deleted it.

L130: smaller and shorter scale than what?

> [LD] we added "than other tested factors"

Fig.2: why not include the actual correlation value for GloSea in the box that just is coloured at the moment. For completeness these should be included.

> [LD] The value in the ERA5 box is not the correlation value corresponding to the colour. It is the percentile value where the correlation of ERA5 is in comparison to the GloSea5 member distribution (see captions)

Fig.2: are the regions that the factors are included only based on ERA5? Are they the same if based on GloSea?

> [LD] Yes, the selected boxes shown are only separated by ERA5. All GloSea5 mean correlations are slightly lower than ERA5, hence, none other box would be added.

Discussion of Figure 3: can you explain/postulate why there is a gap in correlations downstream of Newfoundland?

> [LD] We link this gap to previous studies that find an SST bias in the model for that region. This is included in the Discussion section.

Figure 4: make it very clear that the regions for the left panel are selected based on the results from Figure 3 and the regions for the right panel are based on the results from Figure 1 (I think this is correct).

> [LD] Yes, this is correct. We moved this higher up in the caption and also added it into the Figure itself.

L305: mention that the process-based view skill change is weaker and regionally dependent.

> [LD] We added more information here: ", but with a weaker change and mostly only for skill over Scandinavia"

L324: It would be useful to summarise here what is shown in Figure 4, i.e. the factor-skill view improves windstorm forecasts more than the process-based view, and what this means.

> [LD] Done, we added a short summary here.

Examples of unclear sentences:

L82: sentence beginning "Another factor discovered by .."

L186: sentence beginning "All investigation steps.."

L271: sentence beginning "This first view focuses on…"

L293: sentence beginning "For factor MSLP gradient…"

L337: sentence beginning "The strong link…"

> [LD] We simplified these sentences by shortening them or separate into multiple shorter sentences. The whole manuscript has been carefully read for clarity and proof read again.

Suggested technical/writing corrections:

L2: remove "the" from "the seasonal forecasts"

L6 and elsewhere: re-analysis —> reanalysis

L38: add "the" before "DEMETER"

L44: this seasonal hindcasts —> these seasonal hindcasts

L58 and elsewhere: EGR —> Ehe EGR

L62: measurement —> measure

L64: could demonstrate —> demonstrated

L66: upper tropospheric PV anomaly —> an upper-tropospheric PV anomaly

L74: Other influencing factors for —> Other factors influencing

L81: to impact —> that impact

L93: factor's —> factors'

L100: the seasonal forecast of —> seasonal forecasts from

L128: Dynamical factors are selected by previously known connections to windstorms or cyclones. —> The dynamical factors included here are selected based on their known connections to windstorms or cyclones.

L143: are you trying to say that the schematic is very good? If not, "exemplary" is not the correct word here and I suggest changing "an exemplary schematic" to "a schematic". If you are, add justification for why the schematic is so good.

L143: highlighting —> which highlights

L153: those —> these

L157: members —> member

L161: vs —> versus

L177: the verification for the member individual verification —> verification of individual members

L185: in the results section —> in this section

L190: moderate —> moderately

Caption Fig.1: on climatology —> with respect to the climatology

GloSea5 mean over all ensemble members —> over the mean of all GloSea5 ensemble members

dots shown —> dots are shown

L196: are compared —> are compared in Figure 1

L204: weaker —> stronger?

> [LD] weaker is right, as the scale of the GloSea5 composites is smaller than from the ERA5 composites, hence the signal is weaker.

L215: downstream —> upstream. Definition of upstream "in the opposite direction from that in which a stream flows; nearer to the source". The Atlantic is upstream of the UK, the UK is downstream of the Atlantic. You use upstream in the correct way on L251.

L240: had been —> was.

L243: an agreeing —> a similar

L244: how far —> how well?

L248: MSLP gradient —> The MSLP gradient

L250: upstream —> downstream. Definition of downstream "in the direction in which a stream or river flows."

L250: and stronger —> and with a stronger

L252: factors variables —> factors

L278: The regions for this view —> The regions used for this view

L293: For factor MSLP gradient —> For the MSLP gradient factor

L308: is increasing —> increased

L314: add references to the panels you are comparing here to help the reader follow

L341: remove the semicolon

L345: similar three —> three similar

L361: spacial —> spatial

L392: conceptional —> conceptual

> [LD] all technical/writing suggestions have been changed accordingly in the manuscript.