Ocean Science
Discussions

OSD

**Interactive
comment**

Interactive comment on "Validation metrics for ice edge position forecasts" *by* Arne Melsom et al.

Anonymous Referee #1

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* Summary

Melsom et al. define a number of sea-ice forecast verification metrics for the Arctic ice-edge location and investigate pros and cons of these metrics, most of which are related to or identical with existing metrics. To do so, they consider idealised cases as well as actual near-term (up to ten days) deterministic forecasts of the CMEMS ARC-MFC product. The authors arrive at a set of metrics they recommend for future evaluations of ice-edge forecast accuracy.

The paper is a useful contribution to the ongoing discussion of how to verify sea-ice forecasts and fits the scope of Ocean Science. I have quite a number of remarks, most of which are however probably straight-forward to address. There are also numerous grammar errors, many of which are listed under "Technical corrections" below. Overall, I recommend publication of the manuscript in Ocean Science subject to minor

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revisions.

* Specific comments

P3L29 and elsewhere: often "grid(s)" is used when "grid cell(s)" is meant. Also, sometimes "nodes" is used instead. I recommend to use "grid cell(s)" consistently (where that is meant, of course). This also holds for the Supplement.

P4Eq7: I suggest to make it explicit that d_o and d_m are not single scalars but sets, if I am not mistaken, by writing the right-hand-side as "max(max(d_o),max(d_m))".

P5Eq8: It seems that statements like "aˆ+ = 0 elsewhere" and "aˆ- = 0 elsewhere" are missing in the upper and lower equation, respectively.

P7Eq17: I am somewhat irritated by this equation. For example, when I substitute (i_k)ˆn (bottom left) into the upper equation, the first term in the brackets becomes $1+k(n+1)$, which doesn't seem to make much sense. Isn't (i_k)ˆn supposed to stay the same when the sums are evaluated, that is, should the indices be different?

P8L3-9: It might be OK not to repeat the algorithm for the FSS displacement, but at least a qualitative description of how that quantity is derived from the FSS should be provided.

P9L16-17: "the resulting displacement metrics are also reduced substantially from the Reference case to the Modified case, due to the added ice area's proximity to land."; Is this sentence really saying what it's supposed to say? After all, they are still increasing, only much less.

P10L4-7: It seems worth mentioning that the Hausdorff-type metrics do not require remapping, although it seems OK to do it in this study to ensure consistency. This could also be mentioned in the discussion part

P10L23-32: Here I was surprised that the relation between (DˆIE)hat and DˆIE is not mentioned, and also not the relation between (DˆIIEE)hat and DˆIIEE. Likewise, it's

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worth to highlight already that DˆIIEE and (DˆIE)hat are very similar. You elaborate on this only in the next section, and I think this is an interesting outcome that gives confidence about the robustness of these two metrics which are technically derived in quite different ways.

P11L22-26: What can be concluded from the comparison of the two different observational products? Can this help to understand the relatively large errors that are present already in the initial states? It would be good to comment on this.

P12L8: "This was to be expected"; Actually, I would not have expected such a close match, given the considerably different approach to derive these two metrics.

P12L18: "50 such pairs" -> "50 out of 105 pairs" (correct?)

P14L5-6: Regarding the maps, these would be examples of past performance rather some kinds of averages, which I wouldn't know how that should work, right? Or maps showing the errors for the latest previous forecasts (making use of the slow decorrelation)?

P14L14-18: I have difficulties to understand this paragraph on the usefulness of providing FSS in addition. I suggest to either explain a bit more, or to remove this paragrapgh.

P15L1-3: Is the Palerme et al. paper published now? It's not ideal to base an important final recommendation partly on a not-yet-published paper.

P15L3-4: "We have shown that the deterioration in the forecast quality is moderate for these lead times"; Again, I think there should be some discussion on why there is such a relatively large initial error (which is partly responsible for this slow initial error growth, I would say).

Figure2: Is A- and A+ the wrong way around here? Shouldn't A+ be the part where the model/forecast has too much ice?

Figure5: A statement on the units of the y-axis is missing.

Supplement EqS2-S4: It appears strange to me to use the areas (aˆia) as weights when averaging over the different segments the edge consists of. Wouldn't it make more sense to use the lengths l as weights? In case of S3, and neglecting A_0, this would yield simply D... = sum(a)/sum(l) . Also, for the same reason, the term A_0 seems a bit arbitrary: this one would converge to zero for increasing resolution, right? I am also suspecting that this awkward weighting is the reason why the hat-versions of DˆIIEE are by such a large factor larger than those without hat.

* Technical corrections

P1L19-20: "for appropriate" -> "for an appropriate"

P2L4: "distance of the southern route" -> "length of the southern route" (or other way to correct this)

P2L10: "sensitivity test for scale" -> "sensitivity tests for scale"

P2L16: "Carriers" -> "Carrieres"

P2L20: "system" -> "systems"

P2L21-23: I would argue that the scale-dependence is not the only reason for using the FSS; rather, it's the idea of fuzzy verification, acknowledging that the time and location of certain features can't be forecast exactly but rather in a statistical sense.

P3L10: "situations which leads" -> "situations which lead"

P3L12: "results ... is given" -> "results ... are given"

P3L22: "constitutes" -> "constitute"

P3L28: "cells M" -> "cells in product M"

P5L16: "instroduces" -> "introduce(d)"

P5L20: "provides" -> "provide"

P9L12: "introduces" -> "introduced"

P10L1: "Thurday" -> "Thursday"

P11L2: "have been" -> "has been"

P12L2: "is criteron" -> add article

P13L9: "nominator" -> "numerator"

P13L23: "in minds" -> "in mind"

P14L22: "in Supplementary Information document" -> "in the Supplementary Information document"

P15L1: "uo to" -> "up to"

Figure6 (caption): "displaced" -> "displayed"

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